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Editorial Notes

The Southport Case

IT was with a feeling of relief that the Gas Industry saw the conclusion of this long drawn-out and distressing case, which was reported, together with the verdicts, in last week's "JOURNAL." Yet relief that the legal proceedings are finished must not blind us to the many points of principle and practice which the case has raised and which, much as the Industry would like to be able to dismiss it from mind, must inevitably be discussed.

An examination of the evidence makes it clear that the verdict of Guilty in respect of some of the charges was almost inevitable, although the parties were not found guilty on all counts. Our first reaction on learning that the Chief Engineer had been bound over and the Deputy given imprisonment was a sense that justice had not been fairly dispensed, but this was happily rectified by the Judge a few days later.

Both officials were in our view to blame and the final result appears to be a recognition of the fact that the "crime" was one which gave no pecuniary benefit to the parties concerned. In fact, it gave no pecuniary benefit to officers, committee, or the inhabitants of Southport. Therefore, the action of all concerned stands out as one of supreme folly. The most the officers could get out of such folly was a little less worry on the manufacturing side in keeping up to standard (accompanied by more mental anxiety due to knowledge of the irregularities) plus a little kudos at having maintained a relatively high thermal yield per ton of coal carbonized.

The ratepayers as such and the shareholders in the case of a company undertaking may get something by way of lower municipal rates or increased dividend, but the consumer is for all practical purposes unaffected. The profits of all statutory undertakings are so controlled that the worst that can be said is that the consumers are misled. It is like a tradesman pretending to sell a commodity at 15d. per lb. and giving only 15 oz. when the correct price is 16d. per lb. if full weight is given. In these circumstances the pockets of the gas consumers were not affected, but the consumers were misled with regard to the calorific value and particularly with regard to the sulphur content. In these two matters the law was broken and the delinquents have paid the penalty.

One can sympathize with human failings whether found out or not, but the Industry must not let its sympathy in this case give the impression that any support will be found for these practices. If failure to give the declared calorific value is widespread or even occasional, this case will have done good service in urging delinquents to see that their houses are put in order. In the Southport case there were valid reasons for the difficulty in maintaining the calorific value and purity of the gas, but with regard to the former it is probable that the default had been going on for many years, and there was a perfectly simple cure—i.e., to reduce the declared value to a figure which could be maintained without difficulty. With regard to the purification troubles, these could very largely have been avoided by mutual co-operation between all the officers concerned.

The Gas Committee cannot hold themselves blameless in respect of these matters. We are not aware of the constitution of the Committee at Southport, but if there was a technical man on this Committee then his share of the blame is greater than that of the other members, because the others would naturally look to him for guidance. If there was not such a member, then the case opens the question of the desirability of a capable man with technical knowledge of the Industry being on such a committee or the board of a company undertaking. It is not suggested that, having appointed a qualified gas engineer and put him in charge of the undertaking, it is desirable to remove responsibility from him. This would obviously be absurd. But a sympathetic understanding of technical difficulties would give the necessary support to, and probably in many cases be welcomed by, the management, and help to ensure that the plant is maintained in a fit condition to carry out the statutory obligations.

Apportionment of Responsibility

The important point then arises: What action should be taken if a committee or board of directors do not agree to provide the necessary plant? In our view the chief officer should in such cases take steps to place the responsibility on the shoulders of those in power after making the necessary representations, and the calorific value should be reduced to a figure which could be maintained. In the case of the deputy

engineer or subordinates, they should not be parties to deceptions of the nature disclosed. They should state in writing their inability to adhere to the prescriptions and regulations laid down, and either obtain satisfaction or, if the responsible officials of the undertaking do nothing, take steps to inform the board of directors or the committee.

The case at Southport disclosed an almost incredible lack of co-operation, and the chemists themselves, who by-passed their superiors to lay their grievances before the Committee, acted in a manner which can only give rise to repugnance. They, too, were in our opinion to blame, and this raises a question of first importance. To what extent is the junior officer of a gas undertaking responsible for its conduct? In the present case the Deputy Engineer, from the outset, took many steps to remedy the malpractices. He did, in fact, accomplish much over a short period in improving the efficiency of the works to render any "faking" of results wholly unnecessary. The irregularities could have been discerned without a great deal of effort by the Chief Officer responsible. Yet the Deputy had to take the blame for the conduct of the works.

Of course, this was not a straightforward case, but one can imagine a works carried on within the law, managed by a junior, when something untoward happens. Is the junior or his chief responsible? One of the aims set out in the Charter of the Institution of Gas Engineers is to promote knowledge concerning the conduct of gas undertakings, and the Institution will no doubt give, in the interests of the Industry, full consideration to the implications of the verdicts in the Southport case. It may even consider it desirable and politic to set up a committee to discuss these implications and make it clear what the junior's responsibilities in fact are when he accepts a post of works manager responsible to his chief engineer. It is pertinent also to ask whether the Institution may not find it necessary to hold enquiry into the charges which the case implied against the Industry in general. At any rate, means must be found by which the Industry can assure itself that no such charges shall have any validity in the future, and that there is a maintenance of that high standard of professional conduct among its members which the Institution, in its Charter Petition, stressed as one of its objects.

In concluding our reflections upon the particular circumstances of the case, we cannot do better than quote the words of Mr. Justice Croom-Johnson himself when, in altering the sentence of imprisonment to one of binding-over, he said: ". . . this enquiry and the tragic result of it may have some effect in making people engaged in public occupations of this sort appreciate more fully than, perhaps, they do at present, the duty they owe to the public at large as well as to their immediate employers." Far be it from us to moralize, but loyalty is liable at times to become strangely distorted in the passion which the British people have for it.

Coal Supplies in War Time

THE closing weeks of the present Parliamentary session will be devoted mainly to the vital question of national preparedness in the event of war. Such preparations do not, as has been said by many people, imply that war is inevitable, but they should ensure that the nation can look forward to any eventuality with calm confidence. In answer to a question as to the measures which have been taken for the regulation of coal supplies in time of war, Mr. Lloyd, the recently-appointed Secretary of the Mines Department, made the first official pronouncement on a matter which is obviously of vital importance to the Industry. The Government have taken steps to ensure the reservation to the coal industry of sufficient supplies of man power and machinery to secure the continuity of coal supplies during hostilities. The existing statutory Coal Marketing Schemes will control supplies and pithead prices at the point of production. The schemes will be subject to amendment as occasion arises. A coal supplies officer, who will be an official of the Mines Department, and also a member of the coal industry, will be appointed for each coalfield, and his principal function will be to secure that the required quantities and qualities of coal are produced and that deliveries will be promptly effected.

The interests of consumers will be under the supervision of divisional coal officers, who will be stationed in the various regions set up under the Civil Defence Emergency Scheme. They will be assisted by advisory committees of distributors, whose particular function will be to acquaint the divisional coal officers with any difficulties which may arise in the districts. A system of rationing coal will be enforced, and this system will also be applied to gas and electricity. The rationing will take the form of a quota of the consumption during a past period, but there will be a minimum quantity below which no consumer will be rationed. The objects of the rationing will be to stop the unnecessary use of fuel, while at the same time preserving the right of the consumer to use a minimum quantity necessary for his ordinary domestic requirements. The scheme of rationing will be superintended by a local fuel overseer appointed by the various local authorities, and local advisory committees representing suppliers of coal, gas, and electricity will be appointed to deal with special cases which may arise in any area. Supplies of coal to large consumers will be subject to a priority system, and there is no doubt that the Gas Industry will normally appear high up on the list of priorities.

Although the official announcement was only made last week, it was intimated that the organization necessary to give effect to the proposals of the Government is already in force, and it is an open secret that the Gas Industry has been and will be consulted by the Government with regard to all these matters. The various officials whose duty will be to work the scheme have already been appointed, and we assume that in most cases their names are known to the gas undertakings with whom they will have to deal.

War Risks Insurance

THE House of Commons has also displayed the greatest interest in the question of the insurance of war risks, and after the debate on the second reading of the War Risks Insurance Bill, which took place on Monday, July 17, we are able to comment on the matter in somewhat greater detail than was possible last week. The first point which emerged was that although registration under the Bill in respect of the insurance of commodities will before the outbreak of hostilities be purely voluntary, it will be necessary after the declaration of war to make the scheme compulsory. Compulsion is not only necessary for the satisfactory financial working of the scheme, but is equitable in that it will ensure that the risk is spread over the whole nation, and not confined to areas which are especially vulnerable. The Bill will apply to all stocks of commodities, although it is doubtful whether it would be possible to insure gas appliances which are upon the premises of consumers under hire purchase agreements. Although no premiums will be payable until the outbreak of war, there will be a small fee for voluntary registration, and where undertakers decide to register they can be assured that they will obtain immediate cover on the outbreak of war without incurring the delay which would be bound to ensue if no application for insurance were made during times of peace.

The Bill proved to be acceptable to all political parties, and it was suggested by the President of the Board of Trade that criticism was directed not to the actual contents of the Bill, but to those points which were excluded. This, of course, was a reference to the fact that the Bill contains no provision for the insurance of buildings and machinery. There can be no doubt that the insurance of buildings and machinery is in many industries a matter of far greater importance than the insurance of commodities, even although abnormally large stocks of commodities are purchased in accordance with the Government's request. It is apparent that the question of

the insurance of buildings and plant has been exhaustively discussed at conferences between the Government and industrialists, but the Government remained adamant that it would be impossible for them to introduce a scheme under which immediate payment was made for the whole loss sustained by industrialists whose buildings and plant are damaged by hostile aircraft.

The value of buildings and plant contained in this country has been estimated at a rough figure of £12,000,000,000, and the Government hold the view that if any effective cover were extended by the Treasury in respect of so great a risk, the nation's resources in wartime would be undesirably hampered. At the same time, the President of the Board of Trade made it clear that the Government do not consider that it would be equitable to leave the industrialist to bear the whole risk of damage to plant and machinery which might be due to the action of our enemies. Such a loss must to the greatest possible extent be regarded as national and not individual, and a register of all damage to buildings and plant will be compiled during the time of hostilities. This register will be arranged through the Valuation Office of the Inland Revenue Department. At the end of the war a contribution will be made from the Treasury in respect of such loss to the fullest extent which the resources of the State will allow, and which is compatible with the circumstances of the country at the conclusion of hostilities. This might take the form of payment in full up to a certain limit of loss, and thereafter if claims could not be met in full there would be graded assistance.

The President of the Board of Trade reiterated the statement previously made by Sir John Anderson that there are certain classes of essential property which if damaged would require an immediate reconstruction with Government assistance. There is no indication of the precise type of property which the Government have in mind. That would be a matter which would have to be decided upon in each particular case from a consideration of the extent to which the property was essential to the national well-being, and in a lesser degree to the well-being of the locality. Attempts will no doubt be made to persuade the Government to state clearly that gas-works are essential property of the kind which would demand immediate reconstruction with Government assistance. This would assuredly be the case where a gas-works was engaged in work in any way connected with munitions; even if this were not the case, it is hardly conceivable that a substantial locality could for long be left without the means of cooking and heating which depended upon the continuity of a supply of gas.

At the present time, the matters connected with preparation for war, in so far as they are revealed to the public, must of necessity be in the broadest outline, and it is satisfactory to know that the schemes which will come into force during hostilities are so well advanced. The broad general principles have now been decided, and what remains to be done is merely to dot the i's and cross the t's. In these matters of detail, there is no doubt that the Gas Industry through its National Associations will be frequently and profitably consulted by the Government.

Forthcoming A.P.L.E. Conference

One of the best fillips ever given to the gas street lighting load was the very fine demonstration of what gas can do which was staged at Folkestone two years ago in connexion with the Conference of the Association of Public Lighting Engineers held there. It was a splendid co-operative effort on a large scale by the gas engineer and the manufacturer of gas lighting equipment. That demonstration proved beyond any controversy that gas in no way lags behind its competitor, electricity, in fulfilling modern and exacting requirements. The equipment left nothing to be desired, and the planning of the various units was carried out scientifically. A first-class technique in the application of light to the roads—a technique essential to success—has been developed in the Industry, and this development, which has taken place over the past few years, is traceable to co-operative effort. It has lifted gas lighting into an entirely new and better plane.

The Folkestone display, the result of a very great deal of hard work, was essentially a practical as distinct from a merely spectacular demonstration. The effects were reproducible under everyday conditions. The endeavour was excellently supported. Gas engineers from all parts brought their local councillors to see for themselves what gas, properly applied, could accomplish, and they went away much the wiser. Ideas that gas was behind the times gave place to a more balanced view, and we suggest that the Folkestone demonstration has influenced the choice in many long-term gas lighting contracts which have since been gained. But one demonstration of this sort is obviously not enough. We must cover wider ground with further displays, for seeing is believing, and many local authorities and private individuals have, through lack of appreciation of what up-to-date lighting with modern equipment means, a bias in favour of the newer illuminant electricity. All too often opinion is based on contrasting electrical installations of to-day with gas installations which, to say the least, are obsolete. For such obsolete installations gas undertakings are not necessarily always to blame. The gas undertakings supply the gas, and there, so far as they are concerned, the matter ends. The local authorities own the installations and allow them to relapse into a shocking advertisement for gas. Little or no money is spent on them, and then, when a change is clamorously demanded, electricity steps in. Through ignorance of what gas can in fact do, the public is satisfied with the change, and the local councillors concerned receive a pat on the back for their good works.

The Gas Industry needs demonstration and still more demonstration of its public lighting of to-day. For which reason we welcome wholeheartedly the plans which have been made for the forthcoming Conference of the A.P.L.E., which is to be held in Glasgow from September 5 to 8. This may seem a long way off, but it is by no means too soon to think about it and to make a note of the dates and a resolve to attend. Once again the manufacturers of equipment have entered with enthusiasm into the scheme. The efforts they are putting forward deserve the type of backing with which they met at Folkestone ; and we have good reason to believe that this backing will be forthcoming. We look forward once more to gas engineers bringing with them to the Conference their local councillors to see for themselves—this time in Glasgow—the merits of gas for street lighting. The venue provides Scottish gas engineers with a great opportunity.

Commenting on the Final Report of the Ministry of Transport on Lighting, we pointed out that roads other than main roads constitute by far the greater mileage—some 75% of the roads of this country. These roads are for the most part lighted by gas, and we urged that, in tackling the lighting of traffic roads, the Gas Industry should not lose sight of the great need for paying attention to the lighting of the " other " roads, for seeing that the gas lighting is giving such a performance that it can easily withstand competition from electricity. Our Industry has excellent equipment for the lighting of these roads, and we are very glad indeed to know that the demonstration in Glasgow in September next is to concentrate largely on demonstrating this equipment in operation. Most excellent arrangements, we know, have been made for showing the installations, without confusion, in a compact and typical area which will facilitate inspection. The plans are well and truly laid.

The business part of the programme, too, is nicely balanced. We give an outline of the programme in to-day's issue. At two of the sessions there are to be " Gas Papers," and particular attention is to be given to subjects for discussion that will interest the layman, especially those who will attend

as members of lighting committees. On the social side the Conference will enjoy the hospitality for which Glasgow is well known, and there is to be a trip down the Firth of Clyde and through the Kyles of Bute. We look to a good attendance of gas engineers at the Conference, which holds out so much promise for success.

Good and Not So Good

THERE were many bright patches in the 1939 Report of the Board of Examiners of the Institution Education Scheme which we published in last week's "JOURNAL." For years the Examiners have been asking for greater conciseness in students' replies to the questions set and for better sketching and a more liberal use of it. It is refreshing, therefore, to learn from the 1939 Report that in several of the examinations the general standard attained by candidates was very satisfactory and that there was an improvement, too, in the sketching submitted, although in some instances the sketches were too detailed. Criticism is made that in Gas Manufacture there was a tendency in the selection of questions by candidates to emphasize the chemical aspects of the process at the expense of the engineering aspects. Of course, an even balance is desirable in this regard, but in the past Gas Manufacture has been regarded as an engineering as distinct from a chemical engineering practice—and chemical engineering it undoubtedly is. Since the War the introduction of chemical control, and the gradual influx of trained chemists into the Gas Industry, have effected a change to a higher standard of general—not merely thermal—efficiency, and have led to a much clearer understanding of the carbonizing process. Many of the candidates presenting themselves are doubtless engaged on technical supervision of gas making plant, and chemical knowledge is essential to proper interpretation of the results of their work. That they should not neglect the engineering side, goes without saying.

Not all the patches in the Examiners' Report are bright, however. One of the gloomy ones concerns the Diploma in Supply. In Manufacture, twenty were awarded—in Supply, one only. The latter fact is not in the least encouraging. It shows once again that the Industry does not regard the supply side as of anything like the importance of that of the manufacturing side. Yet, as we have said so often before, the need for a high standard of knowledge to deal with problems of distribution and utilization is to-day as great as that required for dealing with problems of production. The remarks of the Examiners on the standard of the work submitted for the Higher Grade Certificate in Gas Engineering (Supply) also do not make happy reading. The standard, we learn, was poor. Here, again, we suggest one must look for the root cause in the Industry's attitude towards the distribution and utilization side. Then, in regard to the Certificate in Gas Supply, the general standard of the work submitted was "not high." We are not much concerned about this, however, for very few candidates were attracted by this particular examination. We have yet to be convinced of the value of the Certificate, which does not constitute a qualification for corporate membership of the Institution. We expressed the view last year that the Certificate is a sort of half-way house between full technical training in gas supply and the technical training which the ordinary run of gas salesmen require to cope with modern conditions. We still query whether this half-way house is necessary or desirable. And we still think that some examination would better meet the need of a standard not too high, but adequate for a very large number of the salesmen required by the Industry.

Mr. George Helps' New Appliances

Mr. George Helps informs us that unexpected delay has occurred in getting ready for demonstration the new gas appliances which he has in preparation. Some of his difficulties are no doubt attributable to the demands of the armaments programme, but we understand that great progress is now being made, and a date will shortly be given for the demonstrations, which are to be in London.

In the meantime, Mr. Helps has several appliances ready for inspection of which he will be pleased to give a private view at Nuneaton if personal application is made by letter. We can strongly recommend those who are interested to write to Mr. Helps, believing that he has some really interesting stuff to show.

The Institute of Fuel

At an extraordinary general meeting on Wednesday last it was agreed to proceed with a petition for a Royal Charter. From 1927, when the Institution of Fuel Technology and the Institution of Fuel Economy Engineers were amalgamated and incorporated in the Institute of Fuel, the membership of the Institute, which now totals 1,127, has steadily grown. Among the objects of the Charter is to uphold the status of members of the Institute by holding or prescribing examinations for candidates for election and by requiring standards of knowledge and experience which can be approved. It is proposed there shall be five classes of membership: Honorary, Chartered Fellow, Chartered Member, Member, Associate Member, and Associate. Substantial entrance fees are to be charged (£6 in the case of a Chartered Fellow) and subscription rates to be raised. We should like to know what the Institute means by the term "fuel technologist," for we cannot find a definition in the proposed by-laws. A gas engineer deals with coal, coke, gas, oil, and tar—all fuels. He is therefore surely a fuel technologist. If he is a member of The Institution of Gas Engineers he can describe himself as "Chartered." Presumably, if he desires to term himself a Chartered Fuel Technologist in the future—provided that the proposed Charter of the Institute of Fuel is granted—he will have to pay a considerable sum for the privilege. It is not that we question the wisdom of the Institute in applying for a Charter. Far from it. A Charter raises the prestige of an institute and raises the professional status of its members. But we should like a more precise definition of "fuel technologist."

Personal

Mr. G. S. FRITH, Engineer, Manager, and Secretary of the Runcorn and District Gas Company, whose retirement has already been referred to in these columns, was recently presented with a camera by the employees of the Company. Mr. G. Britland, handing over the gift, expressed the hope that Mr. Frith would have a long and happy retirement. Mr. J. H. Richmond, of York, the new Engineer and Manager, said he was looking forward to a continuation of the friendly spirit existing throughout the concern.

Mr. Frith is retaining his seat on the Board of the Company with which he has been associated for fifty years.

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Mr. WALTER T. HAINSWORTH, Chief Engineering and Technical Assistant to the Wallasey Gas and Water Department, has been appointed Gas and Water Engineer to the Newton-in-Makerfield Urban District Council in succession to Mr. F. C. Sylvester, who, as already announced in these columns, is taking up the position of Gas and Water Engineer at Mansfield. Mr. Hainsworth has been at Wallasey for three years.

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The wedding took place last week in Wishart Church, Tranent, of Mr. WILLIAM GILCHRIST, Manager of West Wemyss Gas-Works, and Miss Margaret R. Murray, only daughter of Police Inspector James Murray, Tranent. Among many gifts was an oak fireside companion from the Staff of the West Wemyss Gas-Works.

Obituary

Sir ALFRED J. LAW, Conservative M.P. for the High Peak Division of Derbyshire, who died on July 18, was Chairman of the Littleborough Gas Company.

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It is with regret that we announce the death of Mr. F. E. WARD, who for fifteen of his forty years' service with the St. Helens Gas Department was Engineer and General Manager. He retired from the position on Sept. 30, 1937. The funeral took place on Monday.

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The death occurred in the early hours of Monday morning of Mrs. GREENWOOD, wife of Alderman J. W. Greenwood, J.P., Chairman of the Stalybridge Gas-Works Committee. She had been ill for several months.

News of the Week

Cookery Demonstrations were given in the School Room, Calderbridge, on July 11. These were arranged by the Calor Gas (Distributing) Company, Ltd., in collaboration with the Parkinson Stove Company, Ltd., and the local agent, Mr. W. Ireland, of St. Bees. The demonstrations were very ably conducted by Miss P. M. Allen, Diplomee, N.S.T.C.D.S., of the Parkinson Stove Company, and attracted large audiences. Numerous Parkinson "Calor Gas" appliances were exhibited, and the interest shown was very gratifying.

Sanction has been received by the Skelmersdale U.D.C. from the Ministry of Health to the spending of £3,600 on the Gas Undertaking. The sum is to be raised by a loan over a period of 15 years.

An International Conference on Flames and Furnaces will be held from Sept. 17-20, 1940, at the Royal Institution in London. The Institute of Fuel has made itself responsible for convening the Conference, and the technical organization has been undertaken by the British Coal Utilisation Research Association.

The Tender of Messrs. Newton, Chambers & Co., Ltd., amounting to £12,070, for the erection of a new gasholder has been accepted by the Rhyl Urban District Council subject to the approval of the Ministry of Health.

On Paisley Carnival Day, July 15, an "Ascot" Display, arranged in conjunction with the Paisley Corporation Gas Department, took second prize out of 82 entries. The exhibit, staged on a lorry, showed washing hung out to dry and invited housewives to "Wash the Ascot Way."

Although the price of gas in Bangor, Co. Down, is to be increased from 3s. 2d. to 3s. 3d. per 1,000 cu. ft. it is less, with discounts, than the pre-war price, in spite of the fact that wages, coal, and manufacturing costs have gone up by approximately 100%. It will still, claims Bangor, be the second lowest price in Northern Ireland, and lower than the price charged by many undertakings located close to the coal districts in England.

Increased Gas Charges are announced by the Ardrossan Town Council, who are to raise the price by 2½d. per 1,000 cu.ft. to 3s. 11½d. for ordinary consumers and 4s. 2d. for prepayment users. Gas sold for the year ended May 15 was 52,917,500 cu.ft., an increase of 554,100 cu.ft. over the previous year.

A Visit Was Paid by forty members of a Carlisle Veterans' Association to the City's Gas-Works last week. An interesting afternoon was spent in inspecting the plant under the direction of the Engineer and Manager, Mr. J. G. Aitken and members of his staff.

Gas Has Been Chosen by the Risley Parish Council for the public lighting of the village.

Tow Law Urban Council (Co. Durham) has decided to carry out repairs to its Gas Undertaking. The Council has had before it proposals for either repairing the undertaking or carrying out an extensive scheme of renewals and it has been agreed to proceed with the repairs.

Owing to Increases in the cost of coal and other expenses, Southport Corporation has raised the price of gas by 3d. per 1,000 cu.ft. It was stated at a Council meeting that this increase is comparatively small and will not in effect yield sufficient additional revenue to meet the additional cost of coal under the new contracts. These show a further increase for 1939-40 of £7,000 over last year.

A General Meeting of the Wales and Monmouthshire Association of Gas Engineers and Managers will be held at Porthcawl on Thursday, Sept. 21.

A gasholder with a capacity of 3,531,500 cu. ft. is now being built in the Krasnaya Presnya district in Moscow. The new holder, which is intended to supply the dwelling houses and industrial undertakings situated in the districts of Arbat, Dorogomilovo, Krasnaya Presnya, and the Leningrad Chaussee, will be put into operation next year.

U.K. Buys 5 Million Cu. Ft. Daily Output.

Another important stage in the development of the West Yorkshire Gas Grid is announced in a 20-year agreement reached between the United Kingdom Gas Corporation and the Yorkshire Coking & Chemical Co., Ltd., who operate a large coking plant adjacent to the pits of the Glass Houghton & Castleford Collieries, Ltd., and the Pontefract Collieries, Ltd., which are under the same ownership.

Under this contract financial arrangements have been made for the erection at Glass Houghton of a £32,000 gas purifying plant of the latest design, in which up to five million cu. ft. of crude gas per day can be purified and purchased by the United Kingdom Gas Corporation for augmenting the grid supply to meet the increasing demand in the Corporation's area.

The Glass Houghton supply will be in addition to an output of 6,700,000 cu.ft. a day from the large coking plant now nearing completion at Hemsworth pithead, and bulk supplies from other pithead plants to be established in the grid area.

Forthcoming Engagements.

Sept.

7.—North British Association.—Annual General Meeting at St. Andrews.

21.—Wales and Mon. Association.—General Meeting at Porthcawl.

There will be no meeting of the Central Executive Board of the National Gas Council or the Central Committee of the Federation of Gas Employers during August.

Letter to the Editor.

Salaries in the Industry.

SIR,—Now that the 1939 I.G.E. Examination Results have been published, I feel that the plight of young assistants in the Gas Industry should be brought to the notice of those in whose hands the fate of the salaries question lies.

Speaking for myself, could I have foreseen the future at the time of leaving school, I most certainly would have entered the ranks of a more remunerative profession. Indeed, few could be less encouraging.

I have been engaged in the Gas Industry (manufacturing) for nine years, initially serving as an articled pupil, then working with gas plant contractors, and finally gaining an appointment as Works Technical Assistant to a medium sized gas company.

When I left school, I had School Certificate, Matriculation, and Higher School Certificate to my credit, which would have opened most professions to my entrance.

I have the following I.G.E. awards to my name: Ordinary Grade Gas Supply; Ordinary Grade, Higher Grade, and Diploma in Gas Engineering (Manufacture). I have been elected an Associate Member of the Institution.

I now come to the crux of my complaint. The salary I receive works out at approximately 15s. per week *less* than that received by the charge-hands of the undertaking I serve. This with week-end work and great responsibility.

Forgive the personal note to this complaint, but I feel I can best emphasize the case by my own experience. There are doubtless others who can quote similar instances of niggardly return for responsible and skilled services. I trust that other young engineers in similar straits will put forward their cases so that the Gas Industry at large may be made to understand that the younger generation in the Industry is not satisfied. We fervently hope that the salaries question will be put on a national basis.

Yours, &c.,

"TECHNICAL ASSISTANT."

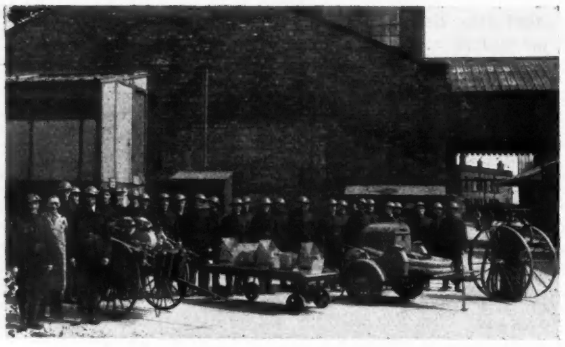
July 24, 1939.

A.R.P. Notes

Preparation in Trafford Park.

At the time of the international crisis, last September, Turner's Asbestos Cement Company (Branch of Turner & Newall, Ltd.), at their Trafford Park Works had hurriedly to improvise air raid shelters for 2,000 workpeople in their stores of raw asbestos. These, though giving ample protection against incendiary bombs, are subject to constant extraction and replacement in the normal course of manufacturing operations.

Since then a complete system of blast and splinter proof shelters have been constructed to accommodate all the employees of the extensive factory and offices covering 25 acres.



Fire-Fighting and Demolition Squad.

These shelters are in the form of tunnels, each 200 ft. long, beneath the concrete floor of a single storey steel frame building. Each tunnel is divided by sandbags into three sections, each of them arranged to accommodate 50 people. Small local shelters have been provided for key-men who, in the event of aerial attack, would have to remain in the works to shut down special plant.

In the main factory buildings half the glazed roof-lighting has already been obscured with asbestos felt, a product of the works, and the remainder of the roof lights can be obscured in 24 hours. *In the event of war the works would continue to operate by artificial light.*

A central control room has been built, from which warning of an air raid can be sounded on the nine syrens throughout the works. The protective suits, respirators, and all the apparatus necessary for the A.R.P. personnel are stored here.

The works fire brigade of 36 trained men has been fully trained in gas and decontamination work and, in addition to the chemical extinguishers available throughout the factory, auxiliary fire pumps are available, and provision is made for a water supply of 30,000 gallons an hour.

Intensive training in A.R.P. and first aid work has been given to some 130 workpeople who have been allocated as squad leaders for evacuation to shelters, decontamination squads, rescue, first-aid, and demolition parties.

One evacuation rehearsal has already been carried out, all the workpeople being safely in the air raid shelters within five minutes of the alarm being given.

Horizontals Invisibly Drawn During Black-Out.

"We were particularly anxious to observe whether New Wortley Gas-Works would send up a blaze of light into the sky when the coke was withdrawn from the horizontal retorts. We were told that this work would take place at a certain time. The screening of the Works was so effective that we saw nothing." This statement is part of the report published by the official observers who, during the recent black-out at Leeds, were stationed at the top of the Town Hall—a very high point of vantage.

This very satisfactory report of the effective screening of the New Wortley Works while gas was being made during the black-out is of particular interest in as much as the carbonizing plant consists of horizontal retorts operated by Arrol-Foulis stoking machines. Mr. C. S. Shapley, Engineer and General Manager of the City of Leeds Gas Department, informs us that he will be very pleased to take anyone who may be interested round the Works and explain exactly how the screening was carried out.

The operations in No. 2 Retort House during the blackout were as follows: All lights in the retort house were reduced to a minimum and all sources of light shielded. All windows and sky-lights were effectively screened by corrugated iron sheeting, and main openings were covered by tarpaulin sheets operated on the draw-curtain principle. The opening through which the telpher passes was successfully screened by means of a tarpaulin sheet which could be raised or lowered by a rope and pulley. The windows in the stokers' mess room and other cabins, &c., where lights were necessary, were painted A.R.P. black, and a dust sheet tunnel was led from the mess rooms to the retort house to allow the passage of men to and fro.

The main ventilation medium in the form of an ordinary jack-roof running the full length of the retort house was not shielded in any way as the position of the retort benches prevented any light being seen from above.

During the discharging of any retort, in which case the coke is discharged into a telpher skip, the tarpaulin covering the telpher opening was raised into position. The glare from the discharge was eliminated by the use of portable mist sprays, which formed a blanket of steam round the discharge. In addition, the usual slaking of the discharge was carried out with water supplied by hoses.

The charging machines were also fitted with mist sprays, which wetted the coal going into the retorts and also allowed water to spray on to the retort mouth-pieces. The whole forming a blanket of steam round the retort mouth-piece, thus smothering the flames formed by the charging operations and continuing long enough to allow for the removal of the charging machine and the closing of the retort doors.

The whole operation of the charging and discharging of retorts was completed under these conditions, within very reasonable limits of the time usually taken by such draws.

Association of Public Lighting Engineers.

Programme of Annual Conference.

The Annual Conference of the Association of Public Lighting Engineers will be held in Glasgow from Sept. 5 to Sept. 8 under the Presidency of Mr. E. J. Stewart, Glasgow Lighting Inspector. The following programme has been arranged.

The sessions each day will be held in the Technical College.

TUESDAY, SEPT. 5.

10.0 a.m. Civic Welcome by the Lord Provost, supported by Members of the City Council, and Presidential Address by Mr. E. J. Stewart, M.A., B.Sc.

11.0 a.m. Conference Session.
Paper: "Lighting in Glasgow" (illustrated with lantern slides), by Mr. J. M. Ward.

2.30 p.m. Motor Coaches will take Members and Delegates round Glasgow to see lighting lay-out—erection of poles—overhead wiring—tower wagons at work—control stations. At about 6 p.m., visit the City Lighting Department, 20, Trongate, to see laboratories and demonstration of photometry.
Refreshments will be served.
At 7.30 and during the evening, motor coaches leave for inspection of A.P.L.E. demonstration lighting—Glasgow lighting—stair lighting, &c.

WEDNESDAY, SEPT. 6.

10.0 a.m. Conference Session.
Paper: "Modern Gas Street Lighting," by Mr. A. V. Horsfall.

3.0 p.m. Conference Session.
Paper: "Engineering Principles in Lantern Design," by Mr. J. G. Christopher and Mr. J. S. Smyth, B.Sc. (Eng.).

7 p.m. for 7.30 p.m. Banquet and Dance.

THURSDAY, SEPT. 7.

10.30 a.m. Lecture Demonstration by Professor S. Parker Smith, D.Sc., M.I.E.E., A.M.Inst.C.E.

1.0 p.m. Steamboat Trip down the Firth of Clyde and through the Kyles of Bute.
(*Return to Glasgow approx.* 8 p.m.)

FRIDAY, SEPT. 8.

10.0 a.m. Two Papers: (*a*) Illumination of Roundabouts, Bollards, &c.," by Mr. K. Sawyer.
(*b*) "Lighting of Bends and Junctions," by Mr. F. F. Middleton.
Both Papers will be illustrated by lantern slides.

11.15 a.m. Lecture Demonstration by Mr. L. J. Davies, of B.T.H. Company, Ltd., on "Some Aspects of Modern Development in Electric Lamps for Street Lighting."

Demonstrations of modern gas and electric street lighting installations will be arranged adjacent to the Conference Headquarters (Central Hotel).

Stewarts & Lloyds and Stanton Merger

The Directors of Stewarts & Lloyds, Ltd., and the Stanton Ironworks Company, Ltd., have agreed to terms for the Amalgamation of the Companies on a Share Exchange Basis.

THE Gas Industry, as principal user of the products of both companies, is intimately concerned with the amalgamation which has been arranged between Stewarts & Lloyds, Ltd., and the Stanton Ironworks Co., Ltd. The merger is one of the most important developments in the iron and steel industry in recent years, and its financial significance can be gathered from the fact that it involves an aggregate issued capital of £10,760,000. The activities of the two Companies have in the past been complementary rather than competitive, in that Stewarts & Lloyds are the largest producers of steel tube, while the Stanton Company has occupied a similar position in the manufacture of cast-iron and concrete pipes. In so far as there has been rivalry between the two sides of the tube industry the effect of the merger will be to lessen the competition that has tended to develop between steel and cast iron.

One of the outstanding advantages will be that both will be available from one source, and whatever competition there is will be concerned solely with the respective merits of steel and cast iron for particular purposes or circumstances. The Gas Industry uses both according to local conditions and will therefore stand to gain from any improvements that accrue from the amalgamation.

While Stewarts & Lloyds have, especially since the opening of their works at Corby five years ago, taken a prominent part in the resuscitation of the basic Bessemer steel industry in this country, the Stanton Company are in the fortunate position of being able to provide ample supplies of pig iron, and the amalgamation is expected to result in closer co-operation between the neighbouring Stanton and Corby works in this respect. Stewarts & Lloyds have one of the most modern steel tube making works in existence, and the Stanton Company have been the pioneers in the production of centrifugal cast-iron pipes. Both Companies have long and distinguished records, and by their efficiency and technical progress have contributed substantially to the improvement of gas distribution in this country and abroad.

The History of Stewarts & Lloyds.

Andrew Stewart first made tubes in Glasgow about 1860 and about the same time the brothers Edward R. Lloyd and Samuel Lloyd set up the Nile Street tube works in Birmingham. Two years later Andrew Stewart was joined by his brother James, and in 1890 they amalgamated with the Clydesdale Iron & Steel Company to form A. & J. Stewart & Clydesdale, Ltd., thus taking the first step towards control of the material required for tube making. In 1903 the Glasgow and Birmingham firms amalgamated to form Stewarts & Lloyds, Ltd.—an organization which secured for the special products of each of the two original firms fresh outlets through the markets and organization of the other.

From time to time important interests were secured in coal mines and iron ore properties in England and Scotland, and in 1920 the blast furnaces, steel works, and ironstone mines of Alfred Hickman, Ltd., and of their subsidiary, Lloyds Ironstone Co., Ltd., were acquired, to be followed in 1930 by the ironstone mines and blast furnaces of the Islip Iron Co., Ltd. With Stewarts & Lloyds are amalgamated firms which date back to the origin of commercial tube making. One of these firms operated the original patent for the manufacture of butt-welded tubes, and another was strongly suspected of systematically infringing the same patent.

The latest chapter in the Company's history is the opening of the works at Corby, at which the first tube was rolled in November, 1934. The main advantages of the new works were the provision of a suppy of good quality tube making material, under complete control, at a cost competitive with foreign supplies; the close union of blast furnaces, steel plant, and tube mills in an integrated whole, resulting in greater efficiency and economy; increased ability to compete in the world's markets; and a better tactical position in bargaining with makers in other countries through independence of foreign supplies.

The visit of The Institution of Gas Engineers to Corby in 1936 is still fresh in mind, and a description of the works and processes was given in the "JOURNAL" of June 3 that year.

The Stanton Ironworks Company.

The history of the Stanton Ironworks Company started about a year before the outbreak of the French Revolution, iron having been first made at Stanton, near Nottingham, in 1788. There are authentic records of cast-iron pipe having been manufactured as early as the middle of the 17th century, but there was no radical change in foundry practice from that time until the end of the Great War in 1918, when the Stanton Company put into practice the Delavaud system of centrifugal casting. Four more years elapsed before the system was put into large-scale operation, and its success has led to the adoption of the centrifugal principle in other methods of pipe casting, and cast-iron pipes are now made centrifugally in sand moulds and cast-iron moulds.

The centrifugal plant at Stanton is the most up-to-date in Europe. Having its own coal mines, ironstone and limestone quarries, the Company has direct control over the bulk of the materials used in the production of cast-iron pipes. A number of visits to Stanton have been paid by gas associations, and a full description of the centrifugal plant was given in the "JOURNAL" of October 23, 1935, on the occasion of a visit by the Eastern Counties Association. Quantity production methods are not confined to the manufacture of centrifugal pipe. At the Holwell Works, near Melton Mowbray, the Company has a large continuous casting plant for the production of the bends, tees, and other standard specials which are a necessary part of every pipe line.

The Stanton-Wilson self-adjusting pipe joint, which works on the stuffing box principle and is made wholly of cast iron, was introduced eight years ago and is now used by over five hundred public utility undertakings. The joint has been especially in demand in the colliery areas of Lancashire, Yorkshire, and the Midlands, where it has proved an effective safeguard against the effects of ground subsidence.

Financial Aspects of the Merger.

The merger takes the form of an offer by Stewarts and Lloyds to the stockholders of the Stanton Ironworks Company to acquire all the issued stock of the Stanton Company on the following exchange terms:

For each £1 unit of 6% preference stock of Stanton Ironworks, one £1 unit of Stewarts & Lloyds 6% first preference stock will be issued.

For each £1 unit of ordinary stock of Stanton Ironworks one £1 unit of deferred stock of Stewarts & Lloyds will be issued, plus 12s. 6d., to be satisfied partly in 5% third preference stock of Stewarts & Lloyds at 22s. per £1 unit and partly in cash.

The arrangement provides that the offer must be accepted by 90% at least of each class of Stanton Ironworks stock, or such smaller proportion as Stewarts & Lloyds may agree to accept.

The issued capital of Stewarts & Lloyds amounts to £7,880,991, comprising £550,000 of 6% cumulative first preference, £850,000 of 10% cumulative second preference, £600,000 of 5% cumulative third preference, £5,880,366 deferred and £625 deferred liaison £1 shares. The £2,878,916 issued capital of the Stanton Ironworks Company consists of £979,562 of 6% cumulative preference and £1,899,354 of ordinary shares. The amalgamation will necessitate the creation of new stock, but as there are 2,489,284 Stewarts & Lloyds £1 shares unissued only a comparatively small amount of new stock will need to be created.

Stewarts & Lloyds, whose Chairman is Mr. A. C. McDiarmid, have been members of the Society of British Gas Industries since 1911, and the Stanton Ironworks Company, whose Managing Director is Mr. E. J. Fox, have been members of the Society since 1917.

F.B.I. Register.

Nineteenth Annual Edition.

Over 200,000 copies of the "F. B. I. Register of British Manufacturers" have been circulated to buyers and merchants in every part of the world since its inception, and the nineteenth annual edition which the Federation of British Industries has just issued will still further extend the contact between the British producer and the purchasing world. Edited by Mr. Ernest A. Nash, the Register contains an alphabetical list of some 5,000 products and services, with the names and addresses of those able to supply them, a complete list of member companies and firms, with brief descriptions of their businesses; details of trade organizations with the names and addresses of officials and membership statistics, and an invaluable register of brands and trade names. An introductory article "About Britain" surveys the industrial situation and gives useful advice on the selection of factory sites for various types of products, having regard to the important considerations of raw materials, suitable labour, markets, transport facilities, services, and finance.

Further Written Contributions to Institution Discussions

Comfort by Gas Heating

Communication No. 211

by
L. W. ANDREW, B.A., B.Sc., M.Inst.GasE.
and
A. BARRON
(Gas Light and Coke Company).

Mr. C. A. Masterman (Gas Light and Coke Company) wrote: Two years ago I had occasion to refer in a Paper to the Institution to the fact that gas at the present time accounts for only about one-fifth of the total domestic heating requirements, a further fifth being carried by coke and the majority of the balance by coal. It is probably fair to suggest that broadly the fifth that we now hold is the proportion within which we are competitive with coal on flat rate charges for gas, covering such uses as cooking, intermittent room heating, and intermittent water heating.

Of the heating requirements in the home, cooking represents the smallest load and is exceeded both by the water heating load and the space heating load. The flat rate price for gas consequent upon the legislative restrictions of the past is the price at which by far the greatest proportion of gas is supplied for domestic purposes and covers not only the price of gas itself as a commodity, but also the various substantial charges in connexion with maintaining the supply, which have to be paid for whether the particular consumer uses much or little.

In any undertaking, if the sales of gas could be doubled the additional gas could be supplied at substantially less than the present average rate. Consequently, this additional gas can be economically competitive where hitherto it has been able to penetrate only as a luxury fuel. Even on flat rate running cost, gas plus coke has been competitive with coal. Where two-part tariff, block rates, or other special rates are available the all-gas house itself becomes an economical proposition, as has been repeatedly stressed by Mr. Ridley, of Newcastle, and others.

The present Paper confirms again the fact, which to many is a surprise, that with coal at, say, 50s. per ton, gas for room heating in a gas fire is competitive at between 5d. and 6d. per therm against the coal fire. This fact is not, however, enough to ensure for gas full expansion into this field which is so important in so far as it represents a load probably exceeding the present total sales of gas for domestic purposes. The use of gas for heating the living room in contrast to its intermittent use in bedroom or dining room is virtually a new use requiring new ideas. The normal gas fire has been designed for intermittent use and new ideas in appliances are required if the public is to be persuaded to accept the advantages of gas heating the living room. Many of the makers and the larger undertakings have been working on this problem. New heating appliances are rapidly being developed, but the fact remains that there is remarkably little fundamental knowledge available as to the factors involved in maintaining persons in comfort by artificial heating.

The present Paper serves a useful purpose in bringing together a great deal of what is already known. The Authors refer to the setting up of a special Committee of the Institution following suggestions made at the Research Meeting last year. The following factors only need be mentioned to emphasize the complex task which that Committee has to face: The relative merits of radiation and convection heating, the significance of temperature and wave-length of radiation, the hygienic significance of ventilation, the æsthetic and psychological aspect of the appliance, the body response to rising and falling temperature gradients, monotony leading to sensory fatigue, and glare. It is in the light of such fundamental knowledge that the new space heating gas appliances require to be designed to take the place of the present somewhat "hit-and-miss" methods, often merely copying what has gone before. If it be the aim of the Gas Industry to extend the use of its fuel in this direction, with so substantial an increase in its load, it is nothing less than the duty of the Gas Industry to inform itself as to the fundamentals underlying these new purposes.

Mr. R. T. d'Eyncourt (Tottenham) wrote: The Authors are to be congratulated on contributing so much valuable information on a subject which must undoubtedly be studied in ever greater detail if the Gas Industry is going to take advantage of the potential load for domestic space heating, which is rightly described as "startlingly high." The presentation of this Paper at the present time is all the more opportune, since to obtain even a share of this potential load it is undoubtedly essential that the Industry should first educate the British public up to a real sense of comfort consciousness. To the foreign observer this sense is almost entirely lacking, and the Englishman is renowned for living in comparative discomfort.

The Authors' suggestion that a comfort service could be sold on a standard scale of charges in accordance with the available means of the individual has obvious and real possibilities. Such a scale would undoubtedly have to take into account, however, the proverbial individualism of the Englishman, and make allowances for the very wide differences in his ideas as to the right combination of heating factors to provide his particular and peculiar ideals of comfort. While mention has been made of the advantages of having zones at different comfort levels, consideration might well be given to the possibility of obtaining these differences in the horizontal plane, since to keep a cool head in all circumstances has physical as well as psychological advantages.

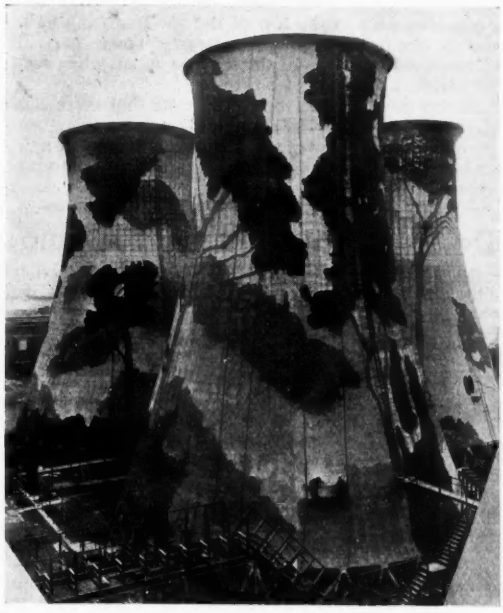
To the average Englishman the maintenance of a high standard of ventilation and rate of air change is always an important factor in his comfort, and at the present time when the medical profession is stressing the importance of properly ventilated rooms, and in some cases suggesting that the open fire with the 9 in. flue is the best and proper means of obtaining adequate ventilation, it is obviously important that the design of gas fires should not be such that in obtaining greater efficiency their capacity to promote a high degree of ventilation is impaired. In this respect the portable fire, standing in front of the open fireplace, tends to produce a higher degree of air change by assisting the natural pull of the flue than the fixed fire with surround, in which the flow of air is so much more restricted.

The consideration of comfort conditions is never complete without some thought being given to the rate of air movement in the room where adequate ventilation is maintained, and the Authors have, in fact, stipulated that there should be "definite air movement without perceptible draught." In the normal English home, however, this definite air movement amounts to little short of a cutting draught across the floor, and in continuing their research on the subject of comfort, I hope that the Authors may find time in the future to give very real thought to the practical and scientific means of eliminating draughts while obtaining the high degree of ventilation which is so desirable. It appears, in fact, that up to the present no serious thought has been given to the method and direction of introducing fresh air into the average domestic room, and it would be true to say that in many cases the standard of comfort conditions obtained in almost any of the alternative methods suggested by the Authors is largely depreciated by failure to eliminate the undesirable draught.

Camouflage

By ERNEST TOWNSEND

Mr. Townsend, who has specially compiled these notes for the "Journal," is a distinguished artist who is particularly well known for his work as portrait painter. He is a regular exhibitor at the Royal Academy. He has also closely studied the subject of camouflage for war, and is at present engaged on a number of urgent schemes in connection with industrial buildings.



[Copyright by Ernest Townsend, Cathedral Studios, Derby.

Camouflaged Cooling Towers. Because of interference with draught, netting could not be fixed over the tops. Therefore, the colours have been painted several feet down inside to break the circular opening. This is pronounced effective from an aerial view.

SINCE the Great War the whole subject of the camouflaging of buildings has received much thought and attention, and its scope and treatment have been considerably widened and extended.

Most of us are familiar with the dabs of green and brown paint used on tents, guns, or any of the other military equipment which needs disguising, but this rather standardized type of camouflaging is rarely satisfactory when used on large buildings and other objects of civilian life. Each requires its own special treatment according to situation and surroundings.

Now that most works have their A.R.P. arrangements well advanced, many responsible people are turning their thoughts to the camouflaging of buildings as a form of protection against air attack, and it is only natural that many who feel interested in the subject show some hesitation in undertaking an elaborate scheme of camouflaging, because, unless it is efficiently dealt with, it can become merely a waste of time and material.

The Problem

There is enough mystery about the matter to create a feeling of uncertainty in the minds of many as to its utility, but its aims are very simple—to disguise from the air any buildings or other objects which may be an attractive target to enemy aircraft, and by so doing make them very difficult to recognize. If properly handled this can be done very effectively.

It is stated that enemy aircraft must begin to locate their target at least some five or six miles away, flying at a height of 15 to 20 thousand ft., and release their bombs at not less than two or three miles distance from the desired target. If, therefore, a works is effectively camouflaged to melt into the surrounding districts, it is easy to understand the difficulties of a harassed airman locating his target with any degree of certainty.

Importance of Colouring

In successful camouflage work it is not only necessary to alter the familiar shapes and lay-out of the buildings and other objects to give them from the air the appearance of something entirely different in character. Since they must also in general colour scheme melt into the surrounding district, suitable colouring is of the utmost importance. During the past few months paint manufacturers have produced a range of special colours for camouflage work, as the ordinary selection of colours manufactured for interior decoration are much too delicate in tint and look insipid and weak when used on roofs and other parts of buildings open to the full glare of daylight.

Camouflage paint must dry with a dull finish. This is essential, as a glossy finish reflects the sky, and glistens in the sun or moonlight, and is therefore useless for camouflage work. The colours are made specially deep and rich, and, if mixed under proper supervision, provide quite a satisfactory range of nature's colours. The greens are the most difficult to handle, as nature's range of green is very wide and varied, and for some unaccountable reason the untrained eye almost invariably mixes green much too blue and cold. This gives it a false and artificial look when applied in the large quantities usually necessary, and as good truthful colour is absolutely essential in successful camouflaging, the importance of this cannot be too much emphasized.

Gasholders

Roofs of buildings and such objects as the tops of gasholders receiving a much brighter outdoor light must be treated in a lower scheme of tone and colour than the sides, which are usually only in a half light. They therefore need lighter colours, so that from a distance the tops and sides look identical, thereby "flattening" the appearance of the object from the air. If this treatment is carried out successfully, and proper use is made of the colouring and characteristics of the immediate surroundings, visibility from the air is greatly reduced. But much time and material can be wasted if these various problems are not understood and appreciated from the beginning of any scheme of camouflaging.

Gasholders are very obvious targets from a great distance, and in addition to the careful selections of colours to melt into the immediate vicinity, the design should be arranged to alter their circular shape. This can be done by making use of any convenient local characteristics which lend themselves to easy and simple treatment, bearing in mind continually that it is the view from the air which is of importance. As gasholders have to be painted at frequent intervals in any circumstances, there should be little difficulty in utilizing the final coat of paint as a camouflage scheme without impairing its utility.

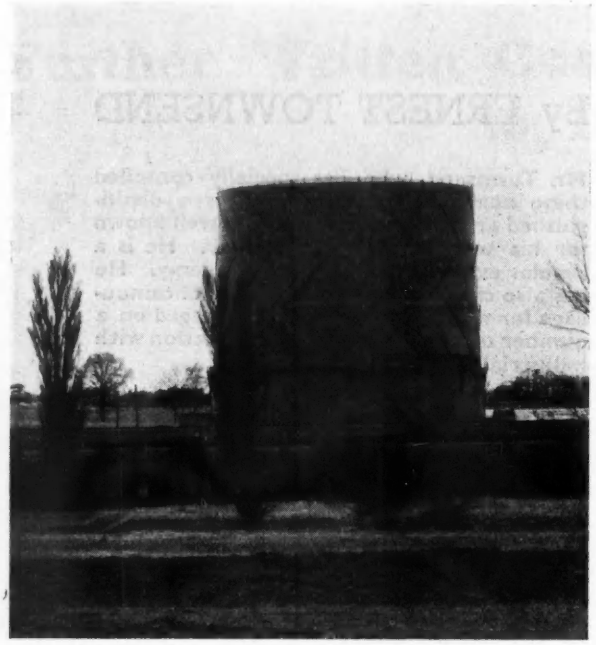
Typical Examples

The necessity for merging buildings into their surroundings has already been emphasized with some monotony. The great importance of this can best be illustrated by four different works which are at present being camouflaged.

One is a works which stretches along a railway siding. The camouflage scheme is therefore mainly the smoky dark grey so characteristic of railways, with strips of grass green suggesting the growth on the embankment, and airmen who have flown over these works report that they are almost invisible.

Another works stands in the midst of streets and streets of new houses; therefore, from the air it is being made to look like a housing estate.

Another works stands quite alone out in the country, surrounded only by fields and woods, so the works are treated as



Gasholder for Tottenham and District Gas Co. at Hitchin.
Chief Engineer: Harold C. Smith, M.Inst.C.E., M.Inst.Gas E.

SAFE from corrosion

The ordinary paint film can protect only so long as it remains unbroken. Red Lead, because of its physico-chemical rust-inhibiting properties, has been proved by experiments to protect even a surface exposed by fine scratch lines. In every large steel structure there are joints which it is impossible permanently to seal against the penetration of corrosive influences. It is here that the protection of Red Lead is essential to the life of the structure.

For further information on the protection of iron and steel, see the Fourth Report of the Corrosion Committee of the Iron and Steel Institute. Copies of the conclusions of this Report are freely available on application to this Council.

Advice on specific painting problems can be freely obtained from the Technical Information Bureau of the Lead Industries Development Council, 90, Ebury Street, London, S.W.1. Telephone Sloane 9801.

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fields with hedgerows running across them, and dark clumps of trees are introduced.

Another more difficult scheme is camouflaging a number of cooling towers 140 ft. high with large open tops which cannot even be covered by netting because of interference with the necessary draught. The scheme is, therefore, to paint tall dark pine trees up to the top of the towers, using as a background for the trees a light grass green. This is carried a few feet down inside the tops of the towers, which when seen from the air breaks up the circular form.

These few details are given to illustrate that there can be no standardized treatment in successful camouflaging, and that imagination and experience are essential in arranging the design and scheme of colour, otherwise a great amount of time and material will be wasted.

Detection of Carbon Bisulphide.

Leaflet No. 6 in the series issued by the Department of Scientific and Industrial Research on methods for the detection of toxic gases in industry deals with carbon bisulphide vapour (published H.M. Stationery Office, 3d. net). The situations where this vapour may occur in dangerous concentrations include works where coal gas and tar distillation products are manufactured.

In high concentrations it may cause delirium, coma, and death from respiratory failure. The better known effects, however, are those of a severe chronic poisoning of the nervous system with a great variety of symptoms, varying in degree from slight fatigue and giddiness to serious mental derangement, blindness and paralysis.

It is stated that the permissible concentration of carbon bisulphide vapour in the atmosphere of workrooms should be kept well below one part in 30,000 of air, and preferably not above one part in 100,000.

The standard method adopted for the detection of low concentrations of carbon bisulphide vapour in industry depends upon its interaction with diethylamine and copper acetate, to produce a coloured compound, copper diethyldithiocarbamate. A series of standard colours is first made up by the addition of small quantities of the reagents to dilute alcoholic solutions of carbon bisulphide of known strength. Samples of the air under test are then drawn, by means of a handpump of definite capacity, through a bubbler of alcohol containing the reagents, and the mixture is allowed to stand. The colour developed is compared with the series of standards, and from the number of pump strokes made and of the colour obtained, the concentration is estimated by reference to a table.

Concentrations down to 1 part in 120,000 can be estimated in this manner with 20 strokes, or less, of the pump. Any traces of hydrogen sulphide in the atmosphere will also produce a colour with the reagent. These can, however, be removed (if not more than 1 part in 10,000) by drawing the air sample first through a filter paper impregnated with lead acetate.

Co-Partnership at Watford.

Alterations in the Co-Partnership Scheme of the Watford and St. Albans Gas Company were revealed at the recent annual meeting of the Scheme, at which Mr. Frank H. Jones (Chairman and Managing Director) presided. Also present were Mr. Henry F. H. Jones, Mr. H. N. Lipscomb, and Mr. Frederick Wilson (Directors). Mr. T. C. Battersby (General Manager and Chief Engineer), Mr. E. T. Warren (Secretary), and other officials. About 160 employees attended, representing all the Company's areas.

At the outset the Chairman referred to the sad death of Mr. George Wilks, the late General Manager and Secretary of the Company, and the meeting stood in silence in his memory.

In proposing the adoption of the report and accounts for the nine months ended March 31, 1939, the Chairman referred to the alterations in the rules of the Co-Partnership Scheme, which were approved by co-partners as from April 1, 1939. Under the new scheme bonus would be computed according to the dividends paid to holders of ordinary stock. In addition, each of the Company's areas would have one of its members on the newly-constituted committee. This new committee would be a great help, not only to the Company, but to the individual co-partners. The co-partners' deposits during the period under review showed an increase of £100 over the corresponding period of last year; bonus and interest amounting to £5,546, which had been allocated to co-partners, showed an increase, and stock allotted to members during the nine months amounted to £4,403. The total amount of stock allocated to co-partners since the inception of the scheme in 1909 was £36,749. With regard to the pension fund, the accumulated balance had now reached the sum of £88,671, and 45 pensioners were at present receiving benefits from the fund. The moneys of the scheme had been carefully invested. The membership of all the welfare schemes showed a further increase, and during the nine months under review the cost to the Company had been over £14,000.

Institution of Gas Engineers.

Questions set in the 1939 Examinations in Gas Engineering (Manufacture) and (Supply).

ORDINARY GRADE (MANUFACTURE).

(Two questions only in each of the three Groups should be attempted.)

GROUP A.

1. Sketch a step grate producer. Indicate probable combustion zones, and their corresponding temperatures.

2. Sketch a hand-operated carburetted water gas plant. Set out a suitable cycle for working such a plant when manufacturing gas of 450 B.Th.U. calorific value. What cause produces a high percentage of CO_2 in the carburetted water gas?

3. Sketch the layout of a coke screening plant to satisfy modern needs. State the capacity of the plant and indicate (*a*) where the various grades are separated, and (*b*) suitable size limits for each grade.

GROUP B.

4. Describe and sketch the main features of a mechanical washer-scrubber. What physical and chemical principles are involved in the washing of gas with water?

5. Discuss the effect of added air for revivification *in situ* on the final thermal results from steamed vertical retorts. What do you consider a reasonable oxygen content for town gas? Give reasons for your answer.

6. How can the dehydration of town gas be effected? What is the object of the process?

GROUP C.

7. How would you determine the amount of ammonia in purified coal gas? In a certain test 9.2 cu. ft. of gas registered at 65° F. and 29.5 in. barometric pressure were passed through the test apparatus containing 25.00 cc. of $\frac{N}{10}$ sulphuric acid. In back titration the "end point" was passed, 24.70 cc. of $\frac{N}{10}$ sodium hydroxide being used. The titration was finished by the addition of 1.50 cc. of $\frac{N}{10}$ sulphuric acid. Calculate the ammonia content of the gas in grains per 100 cu. ft. corrected to 60° F. and 30 in. barometric pressure.

8. Sketch the apparatus used for the Gas Referees' Sulphur Test, and describe how the test is conducted.

9. Sketch the junction of the crown and side sheets of an untrussed gasholder, having a capacity of 1,000,000 cu. ft. What would you regard as suitable for (*a*) the thickness of the outside row of crown sheets, and (*b*) the section of the top curb?

HIGHER GRADE EXAMINATION (MANUFACTURE) Part 1.

(Two questions only in each of the two Groups should be attempted.)

GROUP A.

1. A gas-works is to be built on a new site and foundations are to be prepared for a new retort house to carbonize 300 tons of coal per day. Describe the work to be done as a preliminary to the design of foundations. Describe, with the aid of sketches, any one type of foundation and give the superimposed loading assumed.

2. State which you consider the ideal motive power for each of the various units of plant in a 5,000,000 cu. ft. per day works and give the reasons for your choice and the approximate H.P. required for each unit.

3. (*a*) Describe and sketch the essential details of some form of water softening plant for treating the water to be supplied to boilers for steam generation.

(*b*) Give an outline of the chemical principles involved in the process and state the amount of residual hardness you would expect the treated water to contain.

(*c*) Discuss the effects of deposits of scale, in any type of boiler plant with which you are familiar, both from economic and operating points of view.

GROUP B.

4. Enumerate in detail the procedure necessary for a complete examination of any *one* of the following: (*a*) A column guided gasholder; (*b*) a spiral guided gasholder; (*c*) a waterless gasholder.

5. Describe a modern automatic carburetted water gas plant. Give the approximate quantity of steam generated and used by the plant.

6. Discuss the contamination of gasholder water by hydrogen sulphide. Enumerate the possible causes and state the various steps which can be taken to control them.

HIGHER GRADE EXAMINATION (MANUFACTURE). Part II.

(Two questions only in each of the two Groups should be attempted.)

GROUP A.

1. Give the percentage volumetric composition of a town gas with which you are familiar, stating its gross calorific value.

Indicate the influence of the various constituents upon the general behaviour of the gas when used in a bunsen flame.

2. (*a*) Describe, with the aid of sketches, the essential points to be borne in mind when designing an internal producer for a setting of retorts.

(*b*) What steps would you take to ensure that the volume and composition of the producer gas remained as constant as possible?

(*c*) Give an analysis of producer gas and describe how you would obtain a representative sample from a producer.

3. (*a*) Explain what you understand by the terms "direct" and "semi-direct" as applied to the recovery of ammonia in carbonizing practice.

(*b*) A sulphate of ammonia plant makes use of the total ammonia in the liquor supplied to it, which contains 1% by weight of "fixed" ammonia in the form of ammonium chloride. Give the analysis of a commercial lime and calculate the theoretical amount required to liberate the "fixed" ammonia from each ton of liquor.

(H = 1, O = 16, N = 14, Ca = 40, Cl = 35.5.)

GROUP B.

4. State the principles you would endeavour to follow in sampling: (*a*) Coal, (*b*) Coke, (*c*) Spent Oxide, (*d*) Tar.

State how the procedure should be modified to suit the conditions of any works with which you are acquainted.

5. What type of refractory material would you use for each part of the producers and settings of: (*a*) Horizontal retort plant; (*b*) vertical retort plant?

State reasons for your choice with reference to the properties of the various materials you propose to use.

6. What do you understand by the term "dehydration of gas" as applied to gas-works practice?

Sketch a plant suitable for gas dehydration and describe its operation, stating the position of installation with respect to the gasholders and giving your reasons. Give reasons for the degree of dehydration at which you would aim and describe the tests you would apply for the control of the process.

DIPLOMA EXAMINATION (MANUFACTURE). Part I.

(Four questions only should be attempted.)

1. Give a brief chronological account of the development from the "hand-charged" horizontal retort to the most modern types of carbonizing plant now available. State the advantages gained at each stage of development. Make special reference to the various adaptations of plant to suit different varieties of coal, calorific values of gas, and qualities of by-products.

2. Contrast the methods and results of "shock" and progressive cooling or condensation of crude gas. Briefly describe the function, the best position in the gas stream, and the economies obtainable by final tar-fog precipitation plant.

3. Given an ordinary dry purification installation, what detailed steps would you take to ensure its capability at short notice to take an appreciable overload during short wintry periods? State the main dimensions of the installation exemplified and quote figures supporting your answer.

4. Briefly describe the essential principles of operation of various station gas meters of positive and inferential types. Give details of tests *in situ* for accuracy of registration of one meter of each of the above types, and state how adjustments for inaccuracy are made. How frequently would you carry out periodical tests of station gas meters?

5. Discuss one of the following in the light of recent knowledge: (*a*) The evaluation of crude benzole; (*b*) the use of town gas as fuel for compression ignition engines; (*c*) the cause, detection, and prevention of gum formation; (*d*) the Factories Act of 1937 as it affects gas-works.

DIPLOMA EXAMINATION (MANUFACTURE). Part II.

(Four questions only should be attempted.)

1. Describe and illustrate with sketches a complete foundation and system of bracing for a bench of silica vertical retorts, indicating the position, approximate dimensions and function of each bracing member. Show details of the various provisions for the adjustment of the bracing to allow for the expansion of the bench during the raising of carbonizing temperatures. Draw a "time-expansion" curve for the heating of a new bench of silica retorts.

2. An electrical generating plant is required to supply electrical drives for all usual plant, including coal and coke handling, carbonizing and boosting, for a gas-works of the following total daily capacity: Coal gas, 4,000,000 cu. ft.; carburetted water gas, 1,500,000 cu. ft. Give details of the generating plant you would install, stating the voltage, the capacity of each unit, the switchboard arrangements for sectionalizing the various supplies, and the names of the switchboard instruments you would require.

3. Discuss, with full details of results and costs, the relative economics of steam generation in (*a*) Lancashire boilers fired with coke breeze; (*b*) waste heat boilers. Give your opinion, supported by figures, on the economic aspect of the elimination of retort setting recuperators in relation to steam production from waste heat.

4. Describe fully the "back run" cycle of carburetted water gas manufacture and

describe the modifications which it necessitates in the ordinary plant. What effect has the "back run" cycle on the thermal efficiency and the operating conditions of the carburetted water gas set as compared with the ordinary cycle?

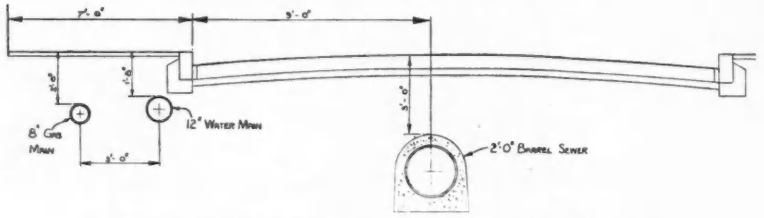
5. Give details of the instructions and precautionary measures you would specify for the safe operation of dry purifiers with particular reference to emptying, filling, and putting into action.

ORDINARY GRADE EXAMINATION (SUPPLY).

(Two questions only in each of the three Groups should be attempted.)

GROUP A.

1. A 6 in. diameter service main has to be laid across a main road to supply a new factory on the side of the road opposite to that on which the existing 8 in. diameter main is located. The attached sketch shows

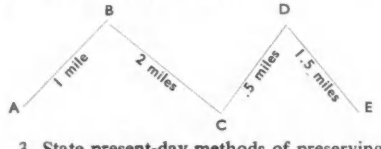


Ordinary Grade Examination in Gas Engineering (Supply). Question I.

a cross section of the road with the position of the 8 in. main and other underground plant. Describe with the aid of sketches how you would carry out the work and give your reasons for the method you adopt.

2. The diagram ABCDE represents a longitudinal section along a main of uniform diameter in which gas is flowing from A to E. No gas leaves the main between A and E, and these two points are at the same level. The water gauge pressures at A, B, C, D and E are 6 in., 6.5 in., 4 in., 4 in., and 3 in., respectively. What would be the pressures at B, C, D and E if the pressure at A were maintained at 6 in. water gauge, but the flow of gas were stopped by closing a valve just beyond E?

If the gas has a specific gravity of 0.5, what is the height of B above A? Water is 800 times heavier than air.



3. State present-day methods of preserving mains and services against external corrosion.

GROUP B.

4. *(a)* State Graham's Law of Diffusion, Boyle's Law, and Charles' Law.

(b) A gas burner will pass gas of specific gravity 0.4 (air = 1) at the rate of 50 cu. ft. per hour at 2.5 in. w.g. pressure. Calculate the discharge if: (i) The sp.gr. of the gas is increased to 0.45 and the pressure increased to 3.0 in. w.g.; (ii) the sp.gr. is increased to 0.6 and the pressure is decreased to 1.25 in. w.g.

5. *(a)* A gas account is made out for 125.25 therms. The conditions of supply were: Calorific value, 475 B.Th.U.; gas pressure, 3 in. w.g.; mean barometric height, 29.4 in. mercury; mean temperature, 54° F.

Calculate the volume of gas passed by the meter and correct to standard temperature (60° F.) and pressure (30 in. mercury).

Specific gravity of mercury = 13.6.

(b) A gas burning appliance consumes 4.23 cu. ft. of gas per hour. The calorific value of the gas is 560 B.Th.U. Calculate the number of hours the appliance can be used for each therm consumed.

6. Describe two devices which are used to avoid, under unfavourable weather conditions, the smothering and possible extinguishing of the gas flames of a water heater, the flue of which communicates with the outside of the building. By means of a diagram indicate in what positions these devices should be placed in relation to the heater and the building. Indicate some positions for these devices, which are undesirable in practice.

GROUP C.

7. *(a)* Prepare a scheme for lighting a public hall, including description of types of lamps and illumination afforded. The hall is 140 ft. long by 80 ft. wide and 20 ft. to eaves and 30 ft. to the ridge.

(b) Describe a distance control system by means of which a number of gas lamps can be operated simultaneously. Give sketches of the valve and the special gas tap which must be used with it.

8. What improvements have been made in dry gas meters in recent years?

9. Briefly describe the following types of furnaces: (*a*) Oven furnace; (*b*) crucible furnace; (*c*) muffle furnace. State the purpose for which you would use each type.

HIGHER GRADE EXAMINATION (SUPPLY). Part I.

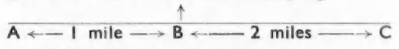
(Two questions only in each of the two Groups should be attempted.)

GROUP A.

1. The accompanying plan shows the layout of a new estate of some 2,000 houses, the roads on which are to be made up in tar macadam. It is proposed that each house should have its domestic hot water supply heated by gas, and that it should also be equipped with a gas cooker, two gas fires and two gas-ignited coke grates.

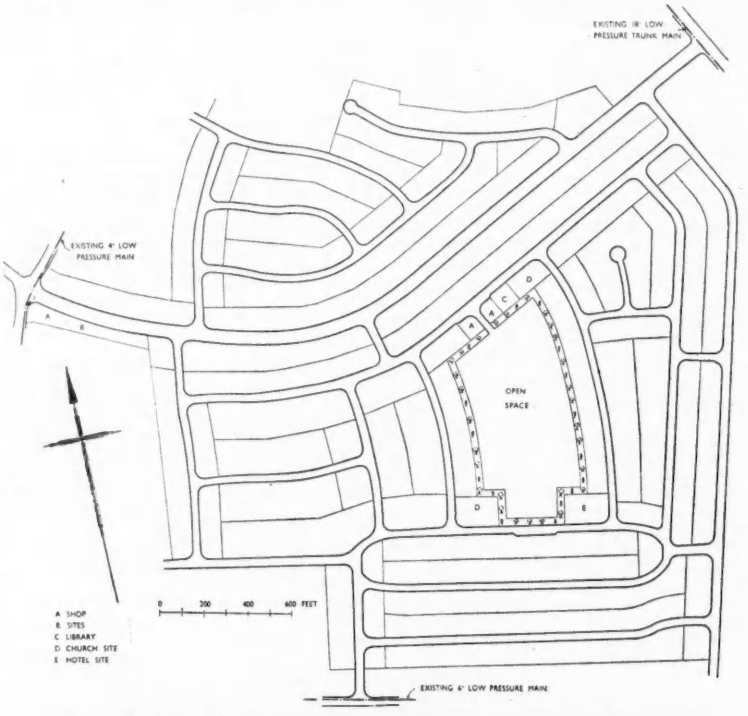
Indicate on the plan the positions and sizes of the mains you would lay for supplying the estate, it being understood that the 18 in. main shown at the north-east corner of the estate has sufficient capacity to supply the whole of the additional load. state your estimate of the peak rate demand of each house and the diameter of the service pipes you would recommend.

2. Make a lined diagram of an underground mercurial governor arranged for air loading. In a governor of this type: The weight of the governor bell and valves is 24.6 lb.; the weight of the air bell is 2.0 lb.; the diameter of the governor bell is 21 in.; the diameter of the air bell is 7 in. What weight would have to be placed on the air bell in order that the outlet pressure of the governor should be 5 in. water gauge?



ABC in the diagram represents an 8 in. main carrying gas from A to C; 25 therms of gas per hour pass along a branch at B and the same quantity is delivered to C. There are no other branch connections or services from the main. The gas has a calorific value of 500 B.Th.U. per cu.ft. and specific gravity of 0.5 (air = 1). The loss of pressure from A to B, as calculated by Pole's formula, is 1.5 in. water gauge.

Using the same formula calculate: *(a)* The pressure loss from A to C; (*b*) the pressure loss from A to C if the gas had a calorific value of 400 B.Th.U. per cu.ft. and specific

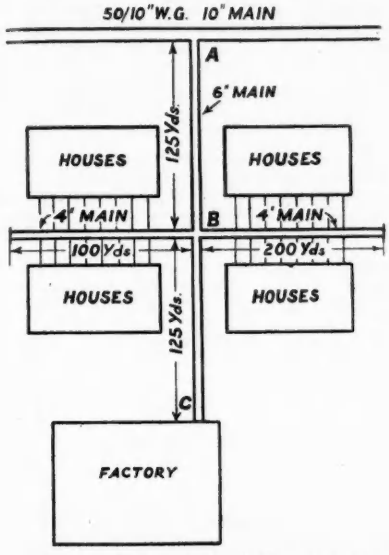


Higher Grade Examination in Gas Engineering (Supply). Part I.—Question I.

gravity 0.6, assuming that the same number of therms were still required at B and C.

GROUP B.

4. A gas of 0.49 specific gravity is supplied from a 10 in. main (pressure maintained normally at 50/10 in. water column) to a 6 in. main at A on the attached sketch. At B on the 6 in. main 125 yd. from A, two 4 in.



Higher Grade Examination in Gas Engineering (Supply), Part I.—Question 4.

mains branch off to supply two streets with a total maximum hourly demand of 30 therms (C.V. 500). On previously undeveloped land a new factory is built at C, 125 yd. from B, which is to have a large steam boiler with an intermittent demand of 100 therms per hour.

It is to be noted that the gas used for steam raising may cut in and out suddenly by the operation of a pressurestat. It is proposed to supply the factory from the existing 6 in. main running down to the entrance of the new building. (*a*) Discuss the effects of the new intermittent demand on the distribution system shown in the sketch ; (*b*) State what you would do to ensure satisfactory service.

5. State the recommended lighting requirements of the Factories Act, 1937.

A factory 100 ft. long by 50 ft. wide by 20 ft. high is to be provided with an illumination of 5 f.c. over the whole floor area. Having regard to the requirement that the illumination shall be reasonably uniform indicate the number and power of the sources you would recommend. Show on a simple plan the positions at which you would install the light sources. Your answer should indicate clearly the reasoning that has led you to adopt the scheme you suggest. State to what extent the lighting recommended would contribute to the comfort conditions of the factory.

6. Summarize briefly the tests necessary to determine whether the performance of a domestic gas cooker is in conformity with modern practice, and indicate wherever possible the order of the results for each of the tests that you would consider to be satisfactory.

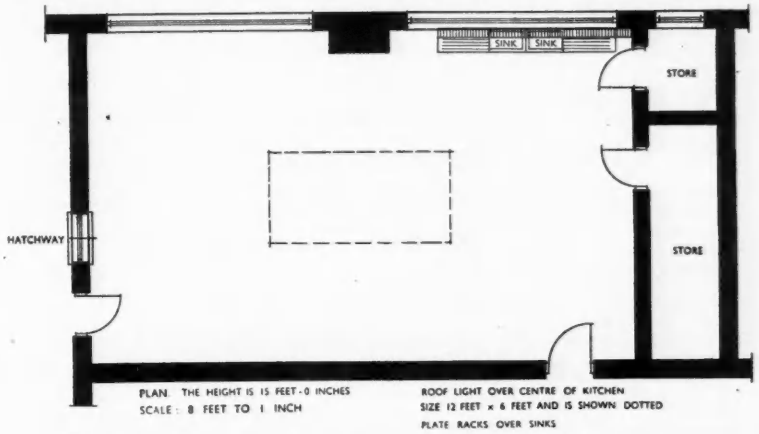
7. (*a*) A five-storey block of flats requires a heating system with an output of 1,000,000 B.Th.U. per hour. Give details of the gas-fired appliance you would specify. (*b*) State the size of flue you would require and the means you would adopt to minimize condensation and what provision you would make to deal with any that might occur.

HIGHER GRADE EXAMINATION (SUPPLY). Part II.

(Two questions only in each of the two Groups should be attempted.)

GROUP A.

1. The accompanying drawing gives an outline of a works canteen kitchen serving midday meals and teas for 250 persons per day. Specify the appliances you would provide and by means of letters and a key indicate their positions on the drawing. Show how you would deal with the products of combustion and general ventilation of the kitchen. State the capacity of the meter you would specify.


SINK
SINK
STORE
HATCHWAY
STORE
PLAN. THE HEIGHT IS 15 FEET - 0 INCHES
SCALE : 8 FEET TO 1 INCH
ROOF LIGHT OVER CENTRE OF KITCHEN
SIZE 12 FEET x 6 FEET AND IS SHOWN DOTTED
PLATE RACKS OVER SINKS

Higher Grade Examination in Gas Engineering (Supply). Part II.—Question 1.

2. Sketch and describe two methods of automatic room temperature control, one of which is to maintain varying temperatures in different rooms heated by a common plant.

3. (*a*) Show by a diagram the arrangement and disposition of a multi-point water heater connected to an existing coke-fired hot water system. The gas water heater is to be used in the summer period and the coke boiler in the winter.

(*b*) What precautions are necessary and what steps must be taken to ensure the satisfactory functioning of gas appliances in an all-gas house before installing a large multi-point gas water heater capable of giving three gallons of hot water per minute. The house is an old one.

GROUP B.

4. Describe the shadowgraph test and the "Lancet" test for the hygienic quality of gas canopies and flues. Describe the Leeds test for radiant efficiency.

5. (*a*) Assuming the thermal efficiencies of a gas heater and an electric heater are equal, how would you calculate the current required for the electric heater to give the same output as the gas heater, the voltage of supply being known? (*b*) What modification in the formula is necessary assuming the thermal efficiencies of the two appliances are different?

6. Attempt either (*a*) or (*b*) of the following sections relating to the use of gas engines. (*a*) (i) Compare the costs, on a B.H.P. basis, of providing power with gas at 4d. per therm, electricity at ½d. per unit, and Diesel oil at 125s. per ton. (ii) State the factors, in addition to the bare cost of fuel, you would take into consideration with each of the above methods. (*b*) (i) Give very brief descriptions of two types of a gas engine driven electricity generator set. (ii) State the factors which must be taken into account in arriving at the cost per unit of electricity generated.

7. What type of furnace would you recommend for hardening high speed steel lathe tools which are approximately 1¼ in. square section by 10 in. long? Give a line sketch showing the type of furnace you would recommend and state the temperature required.

DIPLOMA EXAMINATION (SUPPLY). Part I.

(Four questions only should be attempted.)

1. A supply of gas is required for a new estate of 1,000 artisan type houses on the outskirts of the district. The nearest low-pressure main of sufficient capacity to provide a supply to the estate is two miles away. The gas-works are four miles away. (*a*) Discuss the methods which could be employed to ensure an adequate supply of gas to the new estate; (*b*) draw a chart showing the estimated consumption of gas per hour on the new estate on a typical Sunday in December; (*c*) state how you would make your choice as to the method of supply, it being necessary that the most economic system be used.

2. (*a*) A site is required for a gasholder station in a rural district. Explain the considerations you would have in mind in selecting the site, and state the legal obligations which would have to be observed. Under what circumstances would you recommend high-pressure and low-pressure storage respectively?

(b) What Laws govern the following matters: (i) Giving a consumer a supply of gas ; (ii) discontinuing and cutting off the gas supply ; (iii) right of entry to examine meter, fittings.

3. Answer four of the following: (i) A combustible mixture of gases is contained in a long tube. The mixture is ignited at one end. Say what you know about the velocity of propagation of the flame along the length of the tube. What is meant by "flame speed"? (ii) Upon what factors does equilibrium in a Bunsen flame depend? (iii) What is the significance of the Ott number and of the aeration test burner number (A.T.B.)? (iv) What is meant by detonation wave? (v) State what you know of the intensification of combustion by surface effects.

4. Draw-up and describe a full specification for a domestic gas-fired installation to supply the following:—*First Floor*: Bath, two basins, 10 sq. ft. linen coil and three radiators with a heating surface of 30 sq. ft. each. *Ground Floor*: Basin, pantry, sink, kitchen sink, and four radiators each with a heating surface of 25 sq. ft. The maximum hot water requirements are 50 gallons per hour at a temperature of 140° F. The

temporary hardness of the water is 16° Clark.

5. (*a*) Describe the equipment and organization of a workshop for daily testing and repairing 70 meters of all types; (*b*) state the possible defect and give instructions for repairing a high capacity 1,200 cu.ft. per hour capacity meter which is passing unregistered gas.

DIPLOMA EXAMINATION (SUPPLY).

Part II.

(*Four questions only should be attempted.*)

1. (*a*) With the aid of simple diagrammatic sketches, describe the essential features of three types of low pressure gravity systems of central heating. (*b*) State concisely five important factors which influence the overall efficiency of a gas-fired central heating system.

2. State the basic principles of construction of (*a*) a high pressure bunsen burner; (*b*) a low pressure bunsen burner. Calculate the sizes of the orifices which will deliver an equal number of B.Th.U. under the same pressure head, (*a*) for gas of specific gravity 0.500, Calorific Value 500 B.Th.U.; (*b*) for gas of specific gravity 0.400, Calorific Value 550 B.Th.U. There is a definite relationship between the area of the throat of the injecting tube and the air ports and burner head of the gas burner which will give the maximum induction of primary air. State what you know concerning this.

3. What constitutes good factory and workshop lighting? State what you know regarding the recommendations of the Home Office for factory lighting under the Factories Act, 1937.

4. (*a*) What are the factors limiting the temperature obtainable in non-recuperative gas-fired furnaces? (*b*) What troubles in industrial gas application are attributable to sulphur compounds present in the gas?

5. Write a short account of what you consider to be the most important development of recent years in connexion with the application of gas to one of the following: domestic apparatus, gas engines, or industrial furnaces, stating your reasons and giving an indication of its effect on the future of the industry.

A New Danish Organization

Training Centre and Information Bureau

The increasing interest in gas propaganda in Denmark has led to the establishment of the Nordisk Gas Central. This firm, in co-operation with makers of gas appliances, gas-works, gas fitters, dealers, &c., will start an independent gas school in Copenhagen on August 1.

The gas school will work as a gas information bureau, arranging courses and demonstrations as well as dealing with all questions concerning gas-fired appliances.

The founder of the firm is Mr. John Fridthjof, who during his former employment in the Danish Gas Company as Head of the Propaganda and Sales Department and adviser to the Danish Gas Union, has seen that there is a need for such a bureau. It is now his intention, by co-operating with all parties interested in gas, to increase the turnover of gas and gas-appliances on a sound and economical basis for the gas consumer.

In response to our request for further information of the school, Mr. Fridthjof writes:—

During my employment as Chief of the Sales and Propaganda Department in the Danish Gas Company, I had the opportunity of giving the question of "Home Visits" my especial attention. "Home Visits" include both visits by request, such as those following complaints, and regulation visits—e.g., new consumers or consumers who have had installations altered—and, further, "after sale" visits to ensure that purchasers understand how to use the appliances, as well as those made from house to house to investigate as to whether appliances are working efficiently, or to advise consumers generally.

Partly through personal experience and partly through reports received, I have been able to gather nearly a thousand typical questions which have shown me the need for educational material for the officials who come into contact with consumers, and, as "outside activities" have, up to the present, been very little practised by Danish gas undertakings, the result is that there exists only a minimum of Danish literature on this subject.

Further, as gas-adviser to the Danish Gas Union, I have ascertained that, among people connected with the Gas Industry, including gas-works, gas fitters (plumbers), appliance manufacturers and dealers, there is a real need for information derived from contacts with consumers.

It is therefore my intention independently to arrange for the necessary co-operation between the various persons connected with the Gas Industry, to find collective methods of executing certain activities such as demonstrations for gas-consumers, lectures for fitters, dealers, &c., as well as the production of educational material, &c.

As the name "Scandinavian Gas Central" indicates, the work is intended to cover Denmark, Norway, and Sweden, co-operating with gas associations in those countries as well as similar institutions abroad.

It is my firm belief that the result of establishing the gas school will be an increase in the sale of gas and gas appliances on a fair and economical basis for gas consumers.

New Bakery at Stafford

Gas Heated Oven

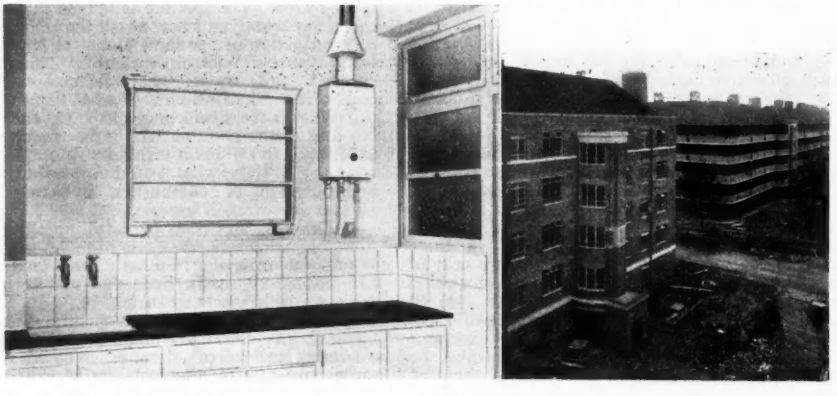
At the official opening of the new Bakery of the Stafford Co-operative Society on Saturday, July 22, the President, Mr. P. E. Donnelly, stated that they were satisfied in every way with the "Simplex" gas heated bakery oven installed by Messrs. Baker Perkins & Co., Ltd., of Peterborough. The oven is designed for the baking of bread alone. It is fitted with swinging trays driven by a 3 b.p.h. motor, and when in full operation two attendants only are required. It has a capacity of baking from 1,100 to 1,200 2 lb. loaves per hour. The gas consumption is claimed to be one of the lowest in the country for an installation of such capacity, averaging a cost of 9½d. per sack of 280 lb. of flour. Stafford Corporation Gas Department have co-operated in this economical production by arrangement of a special contract rate for large scale consumption.

While the swinging trays in the oven and the final prover from which loaves are fed into the oven are operated electrically, the bakery is fitted with a gas engine capable of supplying any power required in the event of electrical breakdown.

Mr. H. T. Hones, Chairman of the Baking Committee, stated that after very searching enquiry as to the utility of oil or gas heated bakery ovens it had been unanimously decided to install a gas heated plant.

Dr. C. M. Walter (Birmingham Gas Department), in wishing success to the new bakery, complimented the Stafford Co-operative Society on the efficient new premises and the arrangement and adoption of so modern and hygienic a unit for the baking of bread.

Gas Water Heating at L.C.C. White City Estate



In each of the 1,200 flats being erected on the L.C.C. White City Estate a "Ewart" multipoint gas water heater has been installed. These splendid "Park Lane" homes for workers, of which we give interior and exterior views, were opened by the Minister of Health, Mr. Walter Elliot, on July 21. Gas refrigerators will be available in some flats at an inclusive cost, including hire of appliance, maintenance and fuel consumed, of only a shilling a week. Kitchens have points for gas cookers, and in a number of living rooms gas-ignited coke grates have been installed as part of the Council's experiments in abating atmospheric pollution by smoke.

Markets and Manufactures

Current Sales of Gas Products

The London Market

LONDON, July 24.

Business in the London Tar Products market during the past week has been very quiet and prices remain unchanged at about the following levels:

Pitch, nominal, at 25s. to 26s. per ton f.o.b.
Creosote, 3½d. to 3¾d.
Refined tar, 3¼d.
Pure toluole, 2s. 5d. to 2s. 6d.
Pure benzole, 1s. 9d.
95/160 solvent naphtha, 1s. 7d. to 1s. 8d.
90/160 pyridine, 11s.
All per gallon naked at makers' works.

The Provinces.

July 24.

Crude Gas-Works Tar, 10s. to 15s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 25s. to 27s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 25s. to 27s.* Toluole, naked, North, 1s. 10d. to 1s. 11d. Coal tar, crude naphtha, in bulk, North 7¾d. to 8¼d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 2½d. to 1s. 3d. Creosote, *ex* works, in bulk, North, liquid and salty, 3⅞d. to 4⅛d.; low gravity, 4d. to 4¼d. Carbolic acid, 60's, 1s. 7d. to 1s. 10d. Naphthalene £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsaleable. Heavy oil: Unfiltered anthracene oil, min. gr. 1,080, 4¾d. to 4⅞d.; filtered anthracene oil, min. gr. 1,080, 5¼d. to 5½d.; heavy tar oil, gr. less than 1,080, 4½d. to 4¾d.

* All prices for pitch are now quoted on the basis of f.o.b. in order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls, whatever they may be.

Scotland

GLASGOW, July 22.

No great volume of business has been placed during the week and, although there is a slight increase in inquiries, prices are substantially unchanged.

Crude gas-works tar.—Actual value is 28s. to 30s. per ton *ex* works in bulk.

Pitch of vertical quality is without interest and prices are nominal at about 20s. to 21s. per ton f.o.b. for export and 20s. per ton *ex* works in bulk for home trade.

Refined tar.—Home trade is looking after substantial quantities, and prices are 3¾d. to 4d. per gallon. Unfortunately export is difficult and prices are 2¾d. to 3d. per gallon, into buyers' packages at makers' works.

Creosote oil is maintained at previous levels, and prices are as follows: Specification oil, 3¼d. to 3¾d. per gallon; low gravity, 4¼d. to 4½d. per gallon; neutral oil, 3¾d. to 4d. per gallon; all *ex* works in bulk.

Cresylic acid.—Supplies are plentiful but there is still no demand and prices are approximately as follows: Pale, 97/99%, 1s. 2d. to 1s. 3d. per gallon; dark, 97/99%, 1s. to 1s. 1d. per gallon; pale, 99/100%, 1s. 4d. to 1s. 7d. per gallon; all *ex* works in buyers' packages.

Crude naphtha is called about 5d. to 5¼d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade is 1s. 4d. to 1s. 5d. per gallon, and 90/190 heavy naphtha about 1s. 1½d. to 1s. 2d. per gallon.

Motor benzole is 1s. 3d. to 1s. 4d. per gallon.

Pyridine.—Prices are unchanged at 10s. to 10s. 6d. per gallon for 90/160 grade and 12s. to 13s. per gallon for 90/140 grade.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole ...	0	9½	to	0	10	per gall. at works
Motor ,, ...	1	3	,,	1	3½	,, ,, ,,
90% ,, ...	1	4	,,	1	4½	,, ,, ,,
Pure ,, ...	1	8	,,	1	8½	,, ,, ,,

Contracts Advertised

Mainlaying.
Milford Haven Gas and Water Department. [p. 242.]

Cast Iron Spun Pipes.
Sidmouth Gas Department. [p. 242.]

Repairs to Gasholder.
Singapore Gas Department. [p. 242.]

Dividend Announcement

Tottenham and District.—Interim Dividends: On Ordinary Stock, 3⅛% actual; on 5% Preference Stock, 2½% actual; on 5½% Preference Stock, 2¾% actual; and on 6% Preference Stock, 3% actual, all less income-tax, payable on August 11, and all on account of year ending 1939.

Gas Light and Coke.—The Directors have declared dividends for the half-year ended June 30 last at the following rates per annum: 4% Consolidated Preference Stock, £4%; 3¾% Redeemable Preference Stock (1970), £3 15s.%; 3½% Maximum Stock, £3 10s.% and Ordinary £5 12s.%.

Commercial.—On the 4% redeemable preference stock 1960/63 for the half-year to June 30, 1939, 4% per annum, less income-tax and payable on Sept. 1, and on the ordinary stock an interim dividend of 2% on account of year ended Dec. 31, 1939, less income-tax and payable August 15, 1939. This compares with interim dividend of 2½%, less income-tax, paid in 1938.

Croydon.—For the half-year ended June 30, 1939, payable on Sept. 1, at the following rates per cent. per annum, less income-tax: Preference Stocks, 4; Maximum Dividend Stocks, 5; and Sliding Scale Stocks, 7.

Watford and St. Albans.—Interim dividends on account of the year ended Dec. 31, 1939: 4% Redeemable Preference Stock (1959), £1 13s. 4d.% (dividend from Feb. 1, 1939, in accordance with the terms of issue); 4% Redeemable Preference Stock (1973/78), £2%; 5% Preference Stock, £2 10s.%; 5½% Preference Stock, £2 15s.%; Ordinary Stock, £3 7s. 6d.%. Rate paid on Ordinary Stock is maximum authorized under the Company's Sliding Scale. Sales of gas during the half-year have increased by 7½%.

PROTECT WITH

METROTECT

a bituminous paint producing a pleasant satin black finish with highly waterproof and anti-corrosive properties.

Protects steel-work which is continuously or periodically immersed in water. Does not become brittle on prolonged atmospheric exposure. METROTECT flows freely under the brush and can be applied quickly and without effort even in cold weather.

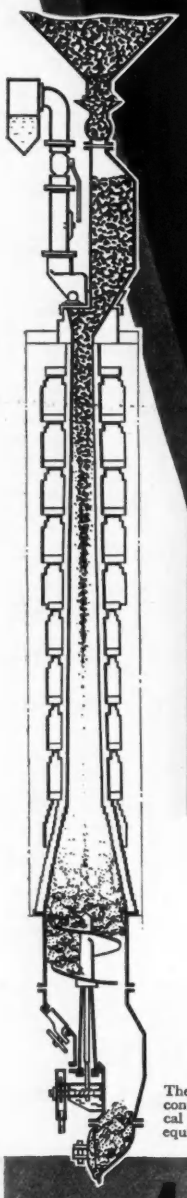
Prices and further particulars from—

SOUTH METROPOLITAN GAS CO.

PRODUCTS DEPARTMENT,
REGIS HOUSE,
KING WILLIAM STREET,
E.C.4.

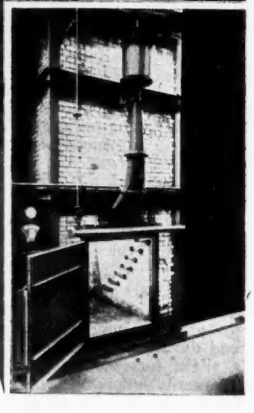
WEST'S

Three installations of Glover-West vertical retorts, with coke-grading and waste-heat recovery equipment, at the Cottesloe gasworks of the Johannesburg Municipal Gas Department, and (*below*) step-grate producer equipped with steam-jet air injector to facilitate the burning of small coke and breeze under pressure—a view in the Glover-West vertical retort house at the Meadow Lane works of the Leeds Corporation Gas Department.



The Glover-West continuous vertical retort and equipment.

Carbonizing Plants



- Increased capacity in relation to ground area covered.
- Output readily adjustable to meet fluctuating demands.
- High yields of gas and coke with low maintenance costs.
- Clean working conditions within the retort house.
- Modern building design and smokeless operation.

WEST'S GAS IMPROVEMENT COMPANY, LTD.
MILESPLATTING, MANCHESTER 10 & COLUMBIA HOUSE, ALDWYCH, W.C.2

Glover-West Vertical Retorts
AND WESTVERTICAL CARBONIZING CHAMBERS

434 PLANTS BUILT OR ORDERED IN 24 COUNTRIES

GAS STOCKS AND SHARES

A continuance of small buying orders and an absence of selling enabled stock markets to maintain a firm undertone last week. The gilt-edged section was practically the only one to remain depressed, mainly on account of the coming Defence Loan issue. Home rails were assisted by the latest good traffic figures and the bulk of industrials closed higher on the week.

There was not a large volume of business in the gas market, though this is usual at a period just prior to the *ex div.* date for "ordinaries." The market, however, was able to record a few upward movements and in the Official List it will be seen that the Hornsey and Lea Bridge stocks show appreciable rises on the recent offer by the South Eastern Gas Corporation, the former gaining 10 points and the latter 17½ points. Imperial Continental closed 4½ points up and British 2 points higher. Falls, however, occurred in Commercial, Tottenham, Wandsworth, and Watford ordinary stocks. The Dudley, Brierley Hill and District Gas Company's stocks have been added to this list, being now officially quoted. This Undertaking has distributed the the basic dividend of 5% since 1931, when the original "A," "B," and "C" shares and new ordinary stock were converted into the existing consolidated stock.

In the provinces the only changes occurred on the Newcastle Exchange where Blyth 5% dropped 7½ to 150 and Newcastle units reacted 6d. to 20s. 6d. In the Supplementary List Lea Bridge stocks were marked up, but Croydon 4% preference was moved down 5 points to 88½. This list has now been enlarged to include the following: Colchester 6% preference and 5% Debenture stocks, and the ordinary stocks or shares of Exeter, Holyhead and North Wales Gas and Water Corporation (£1 shares), Wolverhampton, and Wrexham.

Several important interim dividend announcements have now come in and include two of the three Metropolitan Companies—viz., Gas Light and Coke Company, which is maintaining the rate of £2 16s.% and Commercial 2% against 2½%. In view of the final of 2% for 1938 after an interim of 2½% paid by the latter Company the drop in the current interim was not unexpected. South Suburban is paying 3% (the same), though Tottenham is reduced from £3 7s. 6d.% to £3 2s. 6d. by reason of the increase in the price of gas brought about by higher coal costs.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 21.	Rise or Fall on Week.
1,767,439	Mar. 6	8	8	Alliance & Dublin Ord. ...	130—140	...
374,000	June 19	4	4	Do. 4 p.c. Deb. ...	88—93	...
877,576	May 8	5	5	Asscd. Gas & Water U'd'cs Ord.	16/—18/–	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/–	...
535,545	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	17/—19/–	...
318,730	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	16/—18/–	...
750,000	Mar. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	92—97	...
560,070	Feb. 20	7	7	Barnet Ord. 7 p.c.	150—160	...
300,000	Apl. 6	1/4⅜	1/9⅜	Bombay, Ltd.	19/—21/–	...
181,185	Feb. 20	9½	9½	Bournemouth Sliding Scale ...	185—195	...
690,526	,,	7	7	Do. 7 p.c. max. ...	153—158	...
493,960	,,	6	6	Do. 6 p.c. Pref. ...	125—130	...
50,000	June 5	3	3	Do. 3 p.c. Deb. ...	70—75	...
362,025	,,	4	4	Do. 4 p.c. Deb. ...	95—100	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	110—115	...
357,900	Feb. 20	7½	7½	Brighton, &c., 6 p.c. Con. ...	133—138	...
659,955	,,	6¾	6¾	Do. 5 p.c. Con. ...	118—123	...
205,500	,,	6	6	Do. 6 p.c. 'B' Pref. ...	110—115	...
855,000	Mar. 20	7	8	British Ord.	102—112	+2
100,000	June 19	7	7	Do. 7 p.c. Pref.	136—141	...
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	June 5	4	4	Do. 4 p.c. Red. Deb. ...	92—97	..
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	100—105	+2
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	89—94	...
100,000	22 May '33	6	4	Cape Town, Ltd.	½—1½	...
100,000	6 Nov. '33	4½	4½	Do. 4½ p.c. Pref.	1—2	...
150,000	June 19	4½	4½	Do. 4½ p.c. Deb.	58—68	...
626,860		6	6	Cardiff Con. Ord.	112—117*	...
237,860	June 5	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...
98,936	Mar. 20	2/–	2/–	Colombo Ord.	1 7/16—1 9/16	...
24,510	,,	1/4½	1/4½	Do. 7 p.c. Pref.	22/—24/–	...
739,453	Mar. 20	–/11.48	–/11.48	Colonial Gas Assn. Ltd. Ord. ...	16/—18/–	...
296,144	,,	1/3.30	1/3.30	Do. 8 p.c. Pref.	23/—25/–	...
1,775,005	Jan. 23	5	4	Commercial Ord.	51—56	–2
140,000	Feb. 6	§13/4	4	Do. 4 p.c. Red. Pref. ...	95—100	...
620,000	June 5	3	3	Do. 3 p.c. Deb.	59—64	...
286,344	Feb. 20	5	5	Do. 5 p.c. Deb.	105—110	...
200,000	,,	6¾	4	Do. 3¾ p.c. Red. Deb. ...	95—100	...
807,560	Feb. 20	7	7	Croydon sliding scale ...	123—128	...
644,590	,,	5	5	Do. max. div.	94—99	...
620,385	June 19	5	5	Do. 5 p.c. Deb.	107—112	...
208,660	Feb. 20	5	5	Dudley, Brierley Hill & Dist. Ord.	102—107	...
82,275	,,	5	5	Do. 5 p.c. Con. Pref. ...	103—108	...
79,000	,,	3¾	3¾	Do. 3¾ p.c. Red. Deb. ...	95—100	...
239,000	Feb. 6	5	5	East Hull Ord. 5 p.c. ...	88—93	...
187,215	Feb. 6	6	6	East Surrey Ord. 5 p.c. ...	102—107	...
176,211	June 5	5	5	Do. 5 p.c. Deb. ...	105—110	...
250,000	July 3	4	8	Gas Consolidation Ord. 'B' ...	18/6—20/6	...
250,000	May 22	4	4	Do. 4 p.c. Red. Cum. Pref.	17/—19/–	...
19,189,963	Feb. 6	5⅜	5⅜	Gas Light & Coke Ord. ...	20/6—21/6a	...
2,600,000	,,	3½	3½	Do. 3½ p.c. max.	68—73	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	88—93	...
2,993,000	July 3	3¾	3¾	Do. 3¾ p.c. Red. Pref. ...	90—95	...
8,602,497	May 22	3	3	Do. 3 p.c. Con. Deb. ...	70—75	...
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	105—110	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	102—107	...
700,000	Mar. 6	3½	3½	Do. 3½ p.c. Red. Ded. ...	90—95	...
270,466	Feb. 20	6	6	Harrogate New Cons.	93—103	...
157,500	Mar. 20	‡1/–	‡1/–	Hong Kong and China Ord. ...	3/32—3/4	...
213,200	Feb. 6	5⅜	6	Hornsey Con. 3½ p.c.	108—113	+10
5,600,000	May 8	8	12	Imperial Continental Cap. ...	110—115	+4½
172,810	Jan. 23	3½	3½	Do. 3½ p.c. Red. Deb. ...	87—92	...
235,242	Mar. 6	8½	8½	Lea Bridge 5 p.c. Ord.	155—160	+17½
63,480	June 19	3	3	Maidstone 3 p.c. Deb.	57—62	...
45,000	May 22	†10	†10	Malta & Mediterranean ...	125—130	...
				Metropolitan (of Melbourne) ...		
392,000	Apl. 6	5½	5½	5½ p.c. Red. Deb.	98—103	...
231,977	Feb. 20	5	5	M.S. Utility 'C' Cons.	95—100	...
968,658	,,	4	4	Do. 4 p.c. Cons. Pref. ...	83—88	...
390,076	June 19	4	4	M.S. Utility 4 p.c. Deb. ...	90—95	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...
125,000	July 3	3½	3½	Do. 3½ p.c. Red. Bds. ...	92—95	...
675,000	May 8	†6	†3	Montevideo, Ltd.	55—65	...
250,000	Mar. 6	7½	7½	North Middlesex 6 p.c. Con. ...	135—140	...
396,160	Feb. 6	5	5	Northhampton 5 p.c. max. ...	103—108	...
300,000	April 24	†9	†7	Oriental, Ltd.	135—145	...
468,537	June 5	7	8	Plymouth & Stonehouse 5 p.c.	112—117	...
621,667	Feb. 20	8½	8½	Portsmouth & Gosport Cons.	135—145	...
241,446	,,	5	5	Do. 5 p.c. max.	97—102	...
73,350	,,	5	5	Do. 5 p.c. Pref.	102—107	...
75,000	,,	4	4	Do. 4 p.c. Pref.	82—87	...
114,000	Feb. 6	5	5	Preston 5 p.c. Pref.	102—107	...
247,966	June 19	4	4	Primitiva 4 p.c. Cons. Deb. ...	95—100	...
625,959	,,	4	4	Do. 4 p.c. Red. Deb. ...	93—98*	–1
15,000	Mar. 6	6	6	San Paulo 6 p.c. Cum. Pref. ...	7⅞—8⅛	...
441,275	May 8	1/1⅛	1/1⅛	Severn Val. Gas Cor. Ld. Ord.	18/6—20/6	...
460,810	Mar. 20	–/10⅛	–/10⅛	,, ,, 4½ p.c. Cum. Pref. ...	19/—21/–	...
133,201	Mar. 6	8½	5	Shrewsbury 5 p.c. Ord. ...	110—120	...
9,000	June 5	‡4	‡4	South African Ord.	4—5	..
1,371,752	April 24	1/2⅜	1/2⅜	South East'n Gas Cn. Ld. Ord.	20/6—22/6	...
871,636	Mar. 6	–/10⅛	–/10⅛	Do. 4½ p.c. Red. Cum. Pref.	19/—21/–	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	17/—19/–	..
450,000	Feb. 6	4	4	Do. 4 p.c. Deb.	95—100	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
6,709,895	Feb. 6	5	6	South Met. Ord.	81—86	...
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	118—123	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	83—88	–1
1,895,445	June 19	3	3	Do. 3 p.c. Deb.	68—73	...
1,000,000		5	5	Do. 5 p.c. Red. Deb. ...	103—108*	–2
600,000	Jan. 9	3¾	3¾	Do. 3¾ p.c. Red. Deb. ...	92—97*	–1
1,543,795	Jan. 23	6	6	South Suburban Ord. 5 p.c. ...	103—108	...
512,925	,,	5	5	Do. 5 p.c. Pref.	103—108	...
500,000	,,	4	4	Do. 4 p.c. Pref.	85—90	...
250,000	,,	3¾	3¾	Do. 3¾ p.c. Red. Pref. ...	90—95	...
888,587	June 5	5	5	Do. 5 p.c. Deb.	107—112	...
250,000	,,	4	4	Do. 4 p.c. Deb.	89—94	...
200,000	Feb. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
427,859	Apl. 6	9⅜	1/2⅜	S. Western Gas & Water Ord.	15/—17/–	...
160,523	Apl. 6	–/10⅝	–/10⅝	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...
110,000	June 5	4	4	Do. 4 p.c. Red. Deb. ...	92—97	...
750,541	Feb. 6	5	5½	Southampton Ord. 5 p.c. ...	102—107	...
148,836	June 5	4	4	Do. 4 p.c. Deb.	89—94	...
350,000	Feb. 6	5½	5½	Swansea 5½ p.c. Red. Pref. ...	104—109	...
200,000	June 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	89—94	...
1,076,490	Feb. 20	6¾	6¾	Tottenham and District Ord....	106—111	–4
409,835	,,	5½	5½	Do. 5½ p.c. Pref.	110—115	...
62,235	,,	5	5	Do. 5 p.c. Pref.	102—107	...
453,380	June 19	4	4	Do. 4 p.c. Deb.	87—92	...
85,701	June 5	6	6	Tuscan 6 p.c. Red. Deb. ...	95—100	...
1,131,550	May 8	4	6	U. Kingdom Gas Cor. Ord. ...	15/6—17/6	...
1,051,280	May 8	4½	4½	Do. 4½ p.c. 1st Cum. Pref. ...	17/—19/–	...
762,241	,,	4	4	Do. 4 p.c. 1st Red. Cum. Pf.	17/6—19/6	–/6
745,263	June 5	4½	4½	Do. 4½ p.c. 2nd Non-Cum. Pf.	13/6—15/6	...
1,066,186	Mar. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	92—97	...
378,106	Mar. 6	7	7	Uxbridge, &c., 5 p.c.	†120—†25	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	102—107	...
1,371,138	Jan. 23	7	7	Wandsworth Consolidated ...	108—113	–2
2,525,768	,,	4	4	Do. 4 p.c. Pref.	83—88	...
1,343,964	June 19	5	5	Do. 5 p.c. Deb.	107—112	..
383,745	,,	4	4	Do. 4 p.c. Deb.	89—94	...
400,000	,,	3⅜	3⅜	Do. 3⅜ p.c. Red. Deb. ...	92—97	...
558,342	Feb. 6	6½	6½	Watford and St. Albans Ord. ...	110—115	–2
200,000	,,	5	5	Do. 5 p.c. Pref.	102—107	...
200,000	,,	5½	5½	Do. 5½ p.c. Pref.	108—113	...
200,000	,,	§16/8	4	Do. 4 p.c. Rd. Pf. (1973/8)	93—98	...
100,000	—	—	—	Do. 4 p.c. Red. Pf. (1959)	97—102	...
200,000	June 19	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
200,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	83—88	...

a.—The quotation is per £1 of Stock. * Ex. Div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Contd.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 21.	Rise or Fall on Week.
202,152	Mar. 20	5	5	Ascot Ord.	97—102	...
128,182	July 3	5	5	Do. 5 p.c. Pref.	101—106	...
31,035	Mar. 20	–/4⅛	–/4⅛	Associated Utilities 4 p.c. Pref.	15/—17/–	...
100,000	June 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	93—98	...
17,000	Feb. 20	8	8	Bognor Orig. Ord. 'A' ...	140—150	...
62,210	,,	8	8	Do. New Add. 'A' ...	140—150	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	135—145	...
37,440	Feb. 6	10	10	Cam. Univ. & Town 10 p.c. max.	165—175	...
125,970	,,	7	7	Do. 7 p.c. max.	115—125	...
39,025	,,	5	5	Do. 5 p.c. max.	95—100	...
96,410	Feb. 6	4½	4½	Cardiff 4½ p.c. Pref.	92—97*	–1
55,520	Feb. 6	6	6	Colchester 6 p.c. Pref.	115—120	...
90,550	Mar. 20	5	5	Do. 5 p.c. Deb. ...	103—108	...
150,000	Feb. 20	4	4	Croydon 4 p.c. Pref.	86—91	–5
130,000	June 19	4	4	Do. 4 p.c. Deb.	90—95	...
65,000	Mar. 6	7½	7½	Eastbourne 'A' 5 p.c.	122—132	...
198,000	,,	6	6½	Do. 'B' 3½ p.c.	105—115	..
112,312	,,	5	5	Do. 5 p.c. Pref.	102—107	...
130,000	June 19	5	5	Do. 5 p.c. Deb.	105—110	..
130,500	Feb. 20	7½	7½	Exeter New Ord. (£10)	13⅜—15⅜	...
24,000	Feb. 20	8½	8½	Gt. Yarmouth 8½ p.c. max. (£30)	25—30	...
59,400	,,	7½	7½	Do. 7½ p.c. max. (£30) ...	27—32	..
51,160	June 5	5½	5½	Do. 5½ p.c. Deb.	115—120	...
152,600	Feb. 20	8	9	Guildford Cons.	150—160	...
54,055	,,	5	5	Do. 5 p.c. Pref.	102—107	..
68,250	June 5	5	5	Do. 5 p.c. Deb.	103—108	...
156,600	Feb. 20	7	7	Hampton Court Cons. ...	103—113	...
86,046	June 19	‡4½	‡5	Holyh'd&N.W.G.&W.Cpn.Ord.	13/6—15/6	...
80,000	Mar. 6	4	4	Lea Bridge 4 p.c. Pref.	83—88	+1
60,000	,,	6	6	Do. 6 p.c. Pref.	125—130	+7
94,876	June 5	4	4	Do. 4 p.c. Deb.	87—92	...
73,620	Mar. 6	8⅜	8⅜	Luton Cons. 'A'	150—160	...
107,960	Mar. 20	4	5⅛	Mid Kent Ord. (£10)	8½—9½	...
230,940	Feb. 6	10	10	Oxford & District Ord. ...	162—172	...
47,112	,,	5	5	Do. 5 p.c. Pref.	98—103	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	108—113	...
126,193	May 8	7½	7½	Peterborough Ord.	134—139	...
64,990	Mar. 6	7½	7½	Redditch Ord.	115—125	...
166,850	Feb. 6	8	8	Romford Ord.	137—142	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—102	...
44,000	Mar. 20	5	5	Do. 5 p.c. Deb.	107—112	...
25,570	Feb. 6	5½	5½	Rugby 5½ p.c. Pref.	118—123	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	103—108	...
42,750	June 5	5½	5½	Do. 5½ p.c. Deb.	113—118	...
110,950	Feb. 20	8	8	Ryde Ord.	137—147	...
270,086	Mar. 20	7	7	Slough Ord.	120—130	...
21,000	June 5	5	5	Do. 5 p.c. Deb.	103—108	...
28,872	May 8	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	16/—18/–	...
28,866	Mar. 6	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	17/—19/–	...
117,228	Feb. 20	5	7	Swindon Cons.	100—105	...
60,425	June 5	5	5	Do. 5 p.c. Deb.	103—108	...
64,380	June 19	5	5	Torquay & Paignton 5 p.c. Pref.	102—107	...
130,000	Feb. 6	5	8	Wakefield Ord.	105—115	...
81,650	,,	5	5	Do. 5 p.c. max.	90—95	...
82,000	Jan. 23	6	6	Weymouth Ord.	101—106	...
273,626	Feb. 6	7	7	Wolverhampton Cons. Ord. ...	129—134	...
98,384	Feb. 6	6	6	Do. 6 p.c. Pref.	115—120	...
160,000	June 19	5½	5½	Do. 5½ p.c. Red. Deb. ...	102—107	...
106,490	Mar. 20	5½	5½	Wrexham Ord.	91—96	...
90,000	June 19	5	5	York 5 p.c. Red. Deb.	102—107	...
133,640	Feb. 20	6¼	6¼	Yorktown (Cam.) 5 p.c. Cons.	115—120	...
120,000	,,	5	5	Do. 5 p.c. Pref.	102—107	...
35,000	June 19	5½	5½	Do. 5½ p.c. Deb.	110—115	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 21.	Rise or Fall on Week.
347,756	Feb. 6	5	6	Bath Cons.	115—117	...
1,667,250	Feb. 6	5	5	Bristol, 5 p.c. max.	105—108	...
120,420	June 5	4	4	Do. 1st 4 p.c. Deb.	96—100	...
415,250	,,	4	4	Do. 2nd 4 p.c. Deb. ...	96—100	...
328,790	,,	5	5	Do. 5 p.c. Deb.	113—116	...
274,000	Feb. 20	5	5	Newport (Mon.) 5 p.c. max. ...	95—97	...
13,200	Mar. 20	7	8⅝	Pontyp'l Gas & W. 10 p.c. 'A'	12⅝—13½	...
13,600	,,	6	5	Do. 7 p.c. 'B'	10½—11½	...
40,000	,,	6	5	Do. 7 p.c. 'C'	10½—11½	...
140,778	Feb. 6	5	5	Weston-super-Mare Cons. ...	103½—105½	...
64,338	June 19	4	4	Do. 4 p.c. Deb.	97—99	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	146—150	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 21.	Rise or Fall on Week.
157,150	Feb. 6	5	6½	Chester 5 p.c. Ord.	107—110	...
92,500	June 5	4	4	Do. 4 p.c. Pref.	94—98	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	86—89	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	96—100	...
2,167,410	Feb. 20	6	6	Liverpool 5 p.c. Ord.	115—117	...
245,500	June 19	5	5	Do. 5 p.c. Red Pref. ...	100—105	...
306,083	Jan. 23	4	4	Do. 4 p.c. Deb.	99—101	...
106,280	Feb. 6	10	10	Preston 'A' 10 p.c.	177—187	...
188,219	,,	7	7	Do. 'B' 7 p.c.	129—139	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 21.	Rise or Fall on Week.
122,577	Feb. 20	8	8	Blyth 5 p.c. Ord.	149—151	–7½
732,000	Feb. 20	3	3	Hartlepool G. & W. Co. & New	76—78	...
2,061,315	Feb. 6	5	5¾	Newcastle & Gateshead Con.	20/3—20/9a	–/6
682,856	,,	4	4	Do. 4 p.c. Pref.	88—89	...
776,706	June 5	3½	3½	Do. 3½ p.c. Deb. ...	85½—87½	...
277,285	April 24	5	5	Do. 5 p.c. Deb. '43	101—103	...
332,351	Feb. 6	6	6	Sunderland 6 p.c. max.	129—131	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 21.	Rise or Fall on Week.
542,270	Feb. 6	6	9	Derby Con.	132—137	...
55,000	June 19	4	4	Do. 4 p.c. Deb. ...	100—105	...
20,000	June 19	5	5	Long Eaton 5 p.c. Pref.	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb.	102—107	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 21.	Rise or Fall on Week.
10,000	Feb. 6	10	10	Great Grimsby 'A' Ord. ...	180—190	...
6,500	,,	10	10	Do. 'B' Ord. ...	180—190	...
79,000	,,	10	10	Do. 'C' Ord. ...	175—185	...
1,806,339	Feb. 20	6½	6½	Sheffield Cons.	137—140	...
95,000	July 3	4	4	Do. 4 p.c. Deb.	99—101	...

a The quotation is per £1 of Stock.
* Ex. div. ‡ For year.

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